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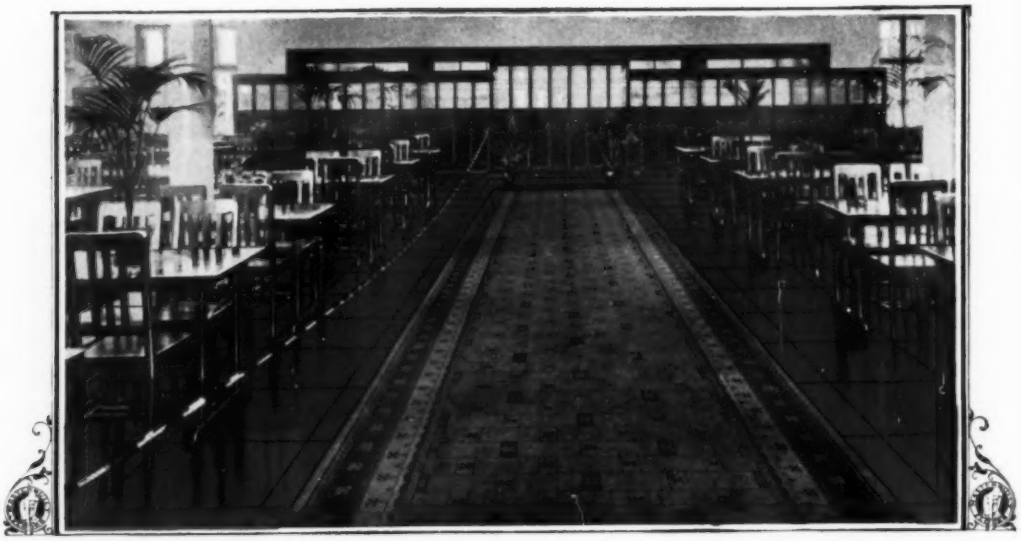

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The ARCHITECTURAL RECORD

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"LA MINIATURA"—RESIDENCE OF MRS. GEORGE MADISON MILLARD, PASADENA, CALIF.

The First Textile-Block Slab House Constructed by Frank Lloyd Wright

The
ARCHITECTVRAL
RECORD

VOLUME 62 DECEMBER, 1927 NUMBER 6

FRANK LLOYD WRIGHT'S TEXTILE-BLOCK SLAB CONSTRUCTION

By
A. N. Rebori

THE WORK OF Frank Lloyd Wright presented in a volume recently published in Holland bears conclusive proof that at least one American architect has created a vital modern architecture from new materials, new methods and new construction, conforming to modern demands. From the very earliest to the latest work, there is evidence of a fixed ideal constantly being developed, placarding the old system and building up a new order, the conception of which is sane and economic with a logic that is imposing. In each particular type, whether it be horizontal projecting, flat roof, monolithic mass formation, "textile-block slab construction" or an admixture of the three, there is no mistaking the source; nor is there any doubt that there is definite expression from a master builder sure of the way.

As a general thing, criticism of an architectural work is concerned with externals, whereas the one outstanding feature of real and lasting value it possesses is in the direct method or sound basic principles of construction upon which it is conceived.

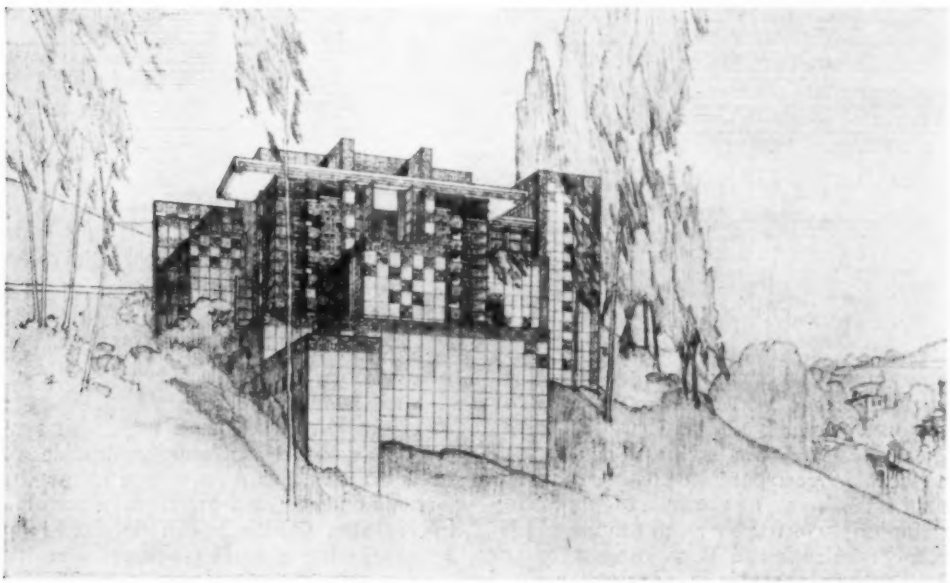
Wright's work is based on a unit system of measure sufficiently flexible to meet exacting plan requirements or the particular needs of a given problem. He arrives at a working formula, based on actual needs, and then proceeds in his own individual and inimitable manner to express these needs in terms of a truly characteristic and indigenous American architecture. Thereby a symphony in architecture is created from within outward reversing the usual order by making the deed fit the need.

As is always the case where a new order aims to dislodge the old, the "stand-patters" raise a hue and cry which is heard far and wide. Thus, Wright has made many enemies and a few ardent admirers. Upon investigation it will be found that those who cried the loudest in derision failed to comprehend the force and truth of the entire movement by confusing actual accomplishment with their own personal dislike for externals which

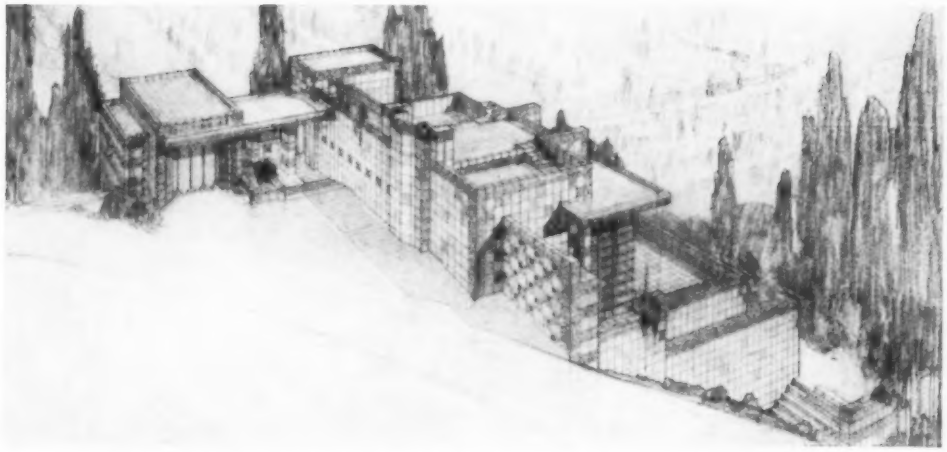
they do not understand. They failed to realize that Frank Lloyd Wright is a master of ideas and not a slave to ideas. His own particular flourish or style, like his own handwriting, is particularly his, but the method and directness of purpose which is the underlying basis of all his designs is basically universal, opening up, as it does, an avenue of deliverance from the old methods which do not meet our modern time and needs.

For the skeptical we recommend a study of this latest book on Wright's work which contains the life work of Frank Lloyd Wright from 1903 to 1925, with contributions by Wright and an introduction by the Holland architect, H. Th. Wijdeveld, and many articles by famous European and American architects and writers. It is published by C. A. Mees, Santpoort, Holland. This book consists of seven special numbers of the art magazine Wendigen, a fine arts publication, the finest in Europe. Its editors and contributors consist of a group of young sculptors, painters and architects, with H. Th. Wijdeveld at their head as editor-in-chief. The book was published in Holland as the result of the widespread European interest in the American architect's creative work. It is intended to be a comprehensive summary and exposition of one man's effort in a modern field of endeavor. The beauty and character of the work, together with opinions from the pen of leading writers both here and abroad, is such as to form a tribute such as no architect probably ever had.

Frank Lloyd Wright had the good fortune of spending seven years during his formulative period of mind in the office and under the tutelage of Louis H. Sullivan. Therefore, it is not strange that when he began to practice for himself he proceeded with a method of work already established. His early work shows a strong leaning for long, horizontal, flat roofs capping the plan requirements. This horizontal tendency is followed in a more restricted form in the middle stage of his development, such as the Coonley House and Unity Temple built about 1903. It is even felt in the



RESIDENCE OF SAMUEL FREEMAN, ESQ., HOLLYWOOD, CALIFORNIA
Frank Lloyd Wright, Architect

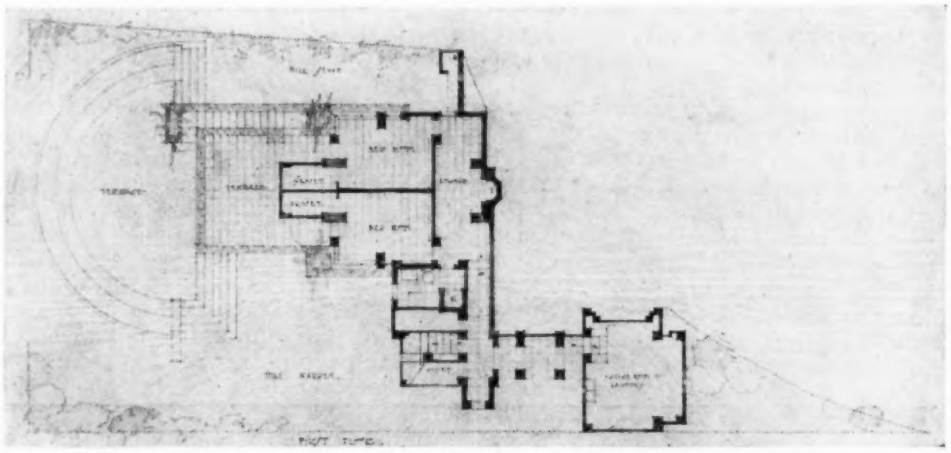


RESIDENCE OF SAMUEL FREEMAN, ESQ., HOLLYWOOD, CALIFORNIA
Frank Lloyd Wright, Architect

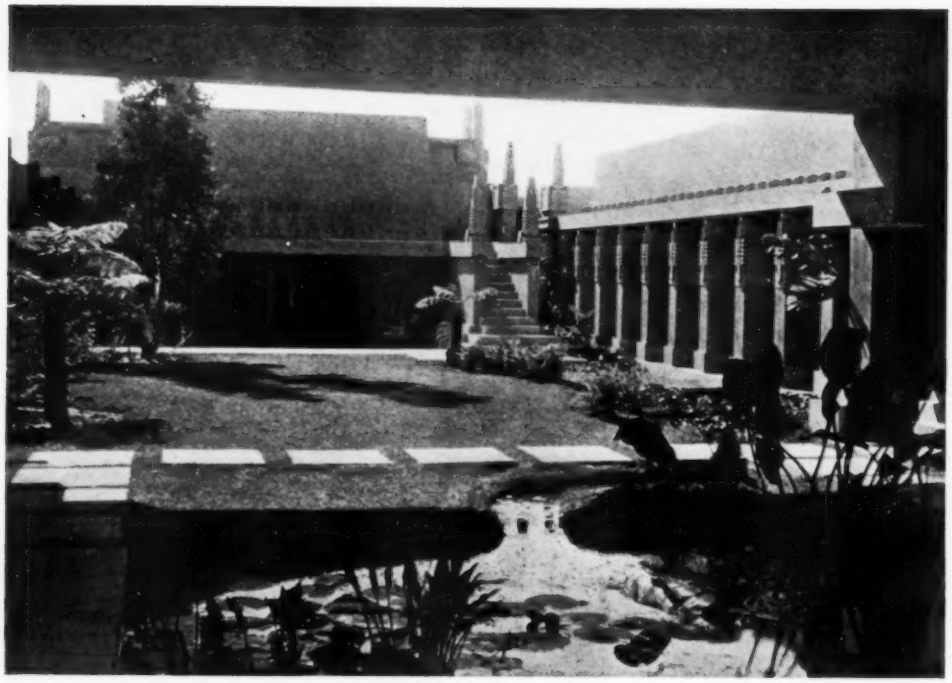
outstanding commercial building built for the Larkin Company in Buffalo about the same period.

Later on a complete change takes place, making its appearance in his earlier California work where a monolithic mass formation is employed and the hat of the early type is removed for a flat roof. Finally the "textile-block slab construction" is born as legitimate offspring of worthy forbears.

So far Mr. Wright has not had an opportunity fully to attack the skyscraper problem and we can only judge his mood towards a typically American type of building from drawings and a model for a twenty-six story reinforced concrete building designed about 1905, which was not built. This design shows a thorough grasp of the handling of reinforced concrete building in a tall structure. It is monolithic in conception from foundation to roof, with uniform windows throughout, the exterior divided by reinforced concrete piers expressed in a symphony of long vertical lines and composed of



RESIDENCE OF SAMUEL FREEMAN, ESQ., HOLLYWOOD, CALIFORNIA
Frank Lloyd Wright, Architect



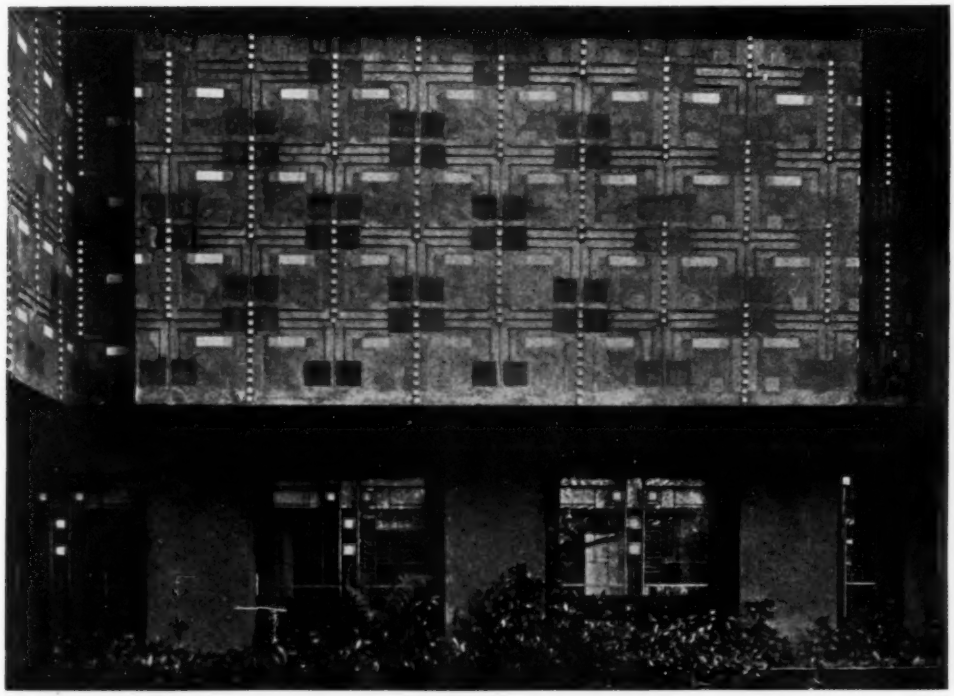
THE BARNSDALL RESIDENCE, HOLLYWOOD, CALIFORNIA
Frank Lloyd Wright, Architect

integral material. What his contribution to the steel skeleton type of building would be, if given the opportunity, can only be surmised by Mr. Wright's recent opinion that a skyscraper should present an all glass appearance with steel columns set back from the face supporting cantilever shelves which, in turn, tie and hold the glass front.

We are living in a scientific age of development, with the aeroplane and automobile an everyday accessory. Yet, in the general practice of architecture we are still bound to the traditional stock and trade forms of Old World buildings and ideas. Wright has succeeded in breaking the old traditions by making use of mechanical methods, modern structural forms and their application by the shaping of monolithic masses and finally by devising a method of building construction calling for the use of ornamented reinforced concrete blocks which he believes will not only reduce the cost of building but which will give each architect an opportunity for individual expression along the line of a well defined and rational building procedure. Each problem has its own solution and should therefore take its form naturally from the requirements or the particular needs and be developed to the full extent of each particular designer's skill.

What we lack most in this country as far as building is concerned, is an exact method of work, fundamentally sound, which arrives at its solution by direct methods based on actual needs, making use of modern building materials at our disposal. Without such a method we cannot speed up construction, practise economy or arrive at a truly great architecture, the methods and principles of which may be universally followed.

Up to the present writing a number of experimental houses have been built with "textile-block slab construction." Since then the experimental work has been carried to a perfected state. The system consists of concrete block slabs about two



THE COONLEY HOME, RIVERDALE, ILLINOIS
Frank Lloyd Wright, Architect

or three inches thick of unit sizes which can be handled, laid on end with interlocking grooves, reinforced horizontally and vertically by means of steel rods tying the inner to the outer shell of the walls. Concrete is poured into the holes through which the rods extend, forming a complete, weatherproof, structural bond of spidery steel reinforcement between the various units making up the general system of design. The pattern or design of the face and the size of the blocks may be varied to suit any particular plan condition or exterior treatment. Floors and roof of these buildings are reinforced concrete tiles and joist knitted to the exterior and interior walls, forming a continuous construction. Walls may be made of varying reveals with the air space between the vertical slabs of the interior and outside wall face, making for warmth in the winter and coolness in the summer.

Mr. Frank Lloyd Wright is now engaged in the design of a number of buildings showing the use to which his new system of construction can be applied. He believes that eventually his method may be economically and efficiently used for the enclosing walls of any type of building, high, low or skyscraper.

The idea was first worked out in the construction of the Millard home—"La Miniatura"—being worked into the sunlight in this building at Pasadena during the winter of 1923.

In connection with these early experiments, it might be interesting to mention the inventor's views so we quote below from his writings on the subject.

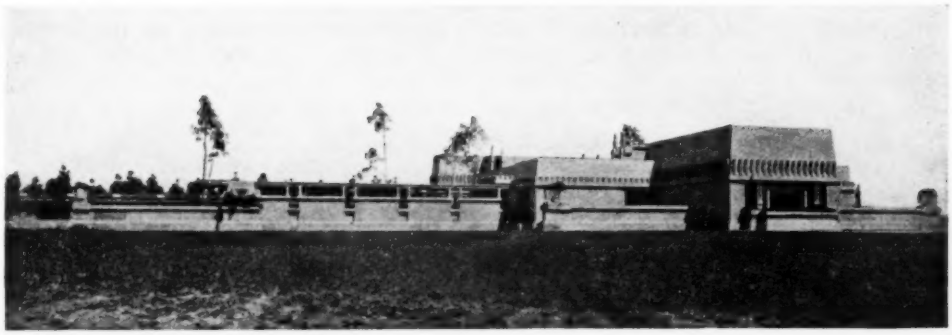
"None of the advantages," says Mr. Wright, "which the system was designed to have were had in the construction of these models. We had no organization. Prepared the moulds experimentally. Picked up 'Moyana' men in the Los Angeles street, and started them making and setting blocks—The work consequently was roughly done and wasteful.

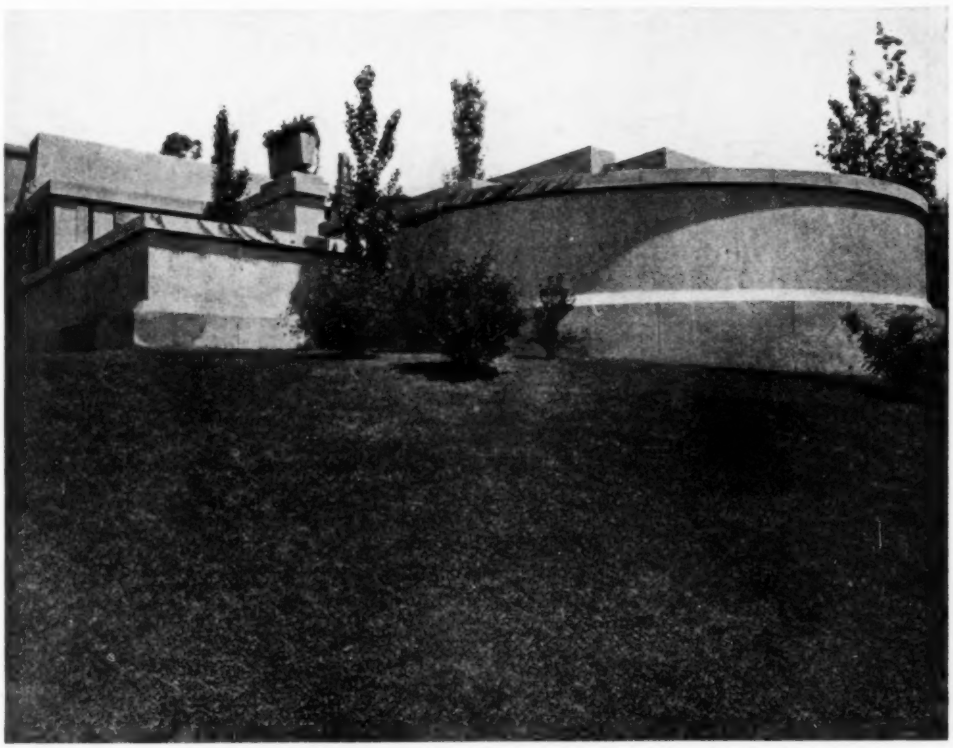
"None of the accuracy which is essential

MIDWAY GARDENS, CHICAGO
Frank Lloyd Wright, Architect

to economy in manufacture nor any benefit of organization was achieved in these models. And yet the cost of the building was not more than that of a frame and stucco building of the usual Los Angeles type, of that same plan, with a good 'Spanish' exterior.

"The blocks were made of various combinations of the decayed granite and sand and gravel of the sites. The mixture was not rich. Nor was it possible to cure the blocks in sufficient moisture. The blocks might well have been of better quality.





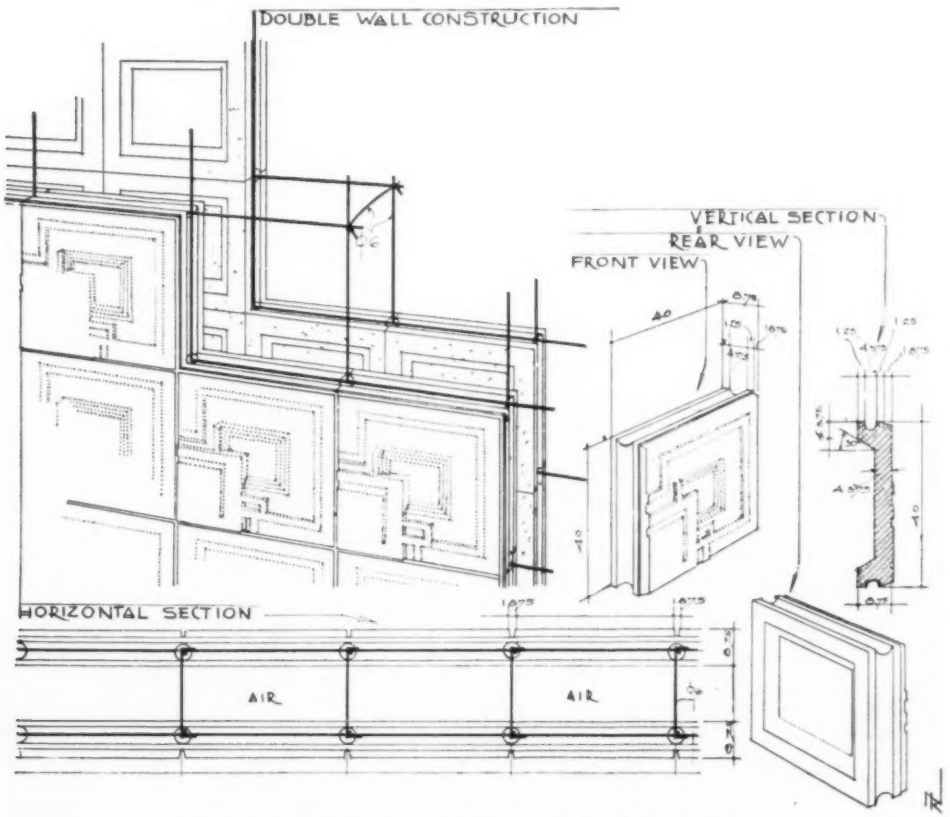
THE BARNSDALL RESIDENCE AT HOLLYWOOD, CALIFORNIA
Frank Lloyd Wright, Architect

"Some unnecessary trouble was experienced in making the buildings waterproof. All the difficulties met with were due to poor workmanship and not to the nature of the scheme.

"But it is seldom that buildings of a new type are built out-right as experimental models with less trouble than were these, notwithstanding our lack of organization and our concentration on invention."

We await with keen interest the outcome on a larger scale of Mr. Wright's latest development and contribution to

the science of art and building. His struggle for recognition has been a difficult one with many trials and tribulations, but never once has he wavered from the set purpose laid down in his badge of recognition by his election as honorary active member of the Academie Royale. Other honors will follow, but what we are particularly interested in is new work from a mind now mature



TEXTILE-BLOCK SLAB CONSTRUCTION, Frank Lloyd Wright

original work which has been followed consistently with constant development through many fruitful years of endeavor.

Once he was classed as an extreme radical and now we find that through enlightenment in modern thought and action, the "radical" is gradually being assimilated as "conservative." Only recently Belgium extended to him a and still vigorously capable of extending and developing a method of architectural demonstration which will be eventually understood and appreciated as it deserves.

Editor's Note—During the Convention of International Town Planners held in Chicago several years ago, our American delegates were amazed by the keen interest shown by the European delegates in the work of Frank Lloyd Wright. In fact, the one place all foreigners wished to visit was one of Mr. Wright's buildings. Once there, they spent an entire afternoon in reverent admiration.

The MODERN MUSEUM
PLAN and FUNCTIONS

By
Richard J Bach

MUSEUMS AND THEIR work are unknown territory to the architect. With the exception of a baker's dozen of men who have actually experimented upon modern buildings of this type, the architect's only contact with the museum problem is the project in design and simple plan entitled A Small Museum, given him in his second year at an architectural school. His answer to the question: What are the chief requirements to be accounted for in a museum plan according to function? would, unless based on special study, receive a lame answer. A museum—a place to exhibit things. There must be galleries; we must allow for exhibition space of all kinds, plenty of it sky-lighted, and of course for circulation too; and there is no need to worry about emptying the building in five minutes, for any crowd in a museum, at least on a work day, can be got out in half of one minute. In any museum to which this statement applies, the aforesaid galleries and circulation are among the chief reasons for the small number of visitors, inadequate services following as a close second.

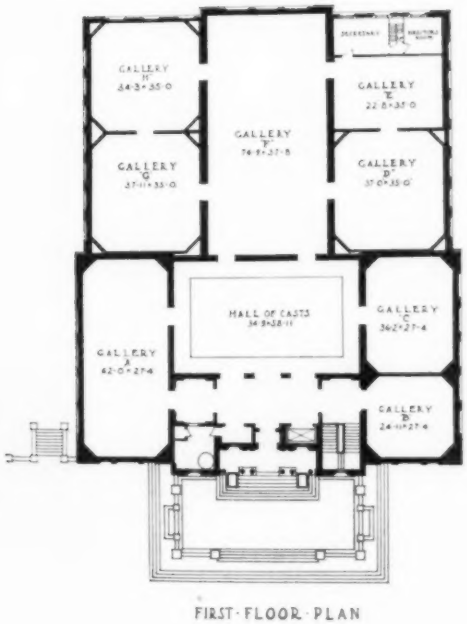
The architect shares with the general public an entire lack of understanding of the functional factor in museums. It is a fact, unfortunately, that exhibition has, until recent years, been the goal of museum work. Somehow a myriad objects get into place in a monumental building and the public is invited in on certain days at certain hours to scuff its feet on endless floors and stare at the serried orderliness of "museum objects." And the public does stare. It is the greatest task of the museum to-day to prevent it (and the architect) from staring.

But the museum to-day has revised the theory which guides its practice. It is now a working institution, and that in two senses: working to get its material and to prepare it for exhibition, working to exploit its possessions for real public benefit and to make them educationally available as source material, directly useful in teaching and in the laboratory sense, all in addition to the general purpose of increasing the knowledge or enhancing the cultural potentialities of the community.

A single exhibited object, though of small size and smaller intrinsic value, though of a kind or species that Jones never expects to possess or even to see alive, may be the product of an excavation in Egypt, an expedition to the Arctic Zone, or an adventure into forbidden or hitherto inaccessible land. According to its history and type it must be classified, catalogued, documented, preserved, put into condition for exhibition, labeled, adequately displayed, perhaps published, all of which are branches of museum work rarely conceived of as active functions, yet perhaps explaining why a large museum can employ several hundred persons of whom the public sees but few.

All of this territory lies back of the exhibited object. But in the museum this object further becomes a member of a community, administered by specialists and demanding specialized equipment, requiring training and facilities of various and specific kinds. There is the matter of storage, of protection, of heating, of lighting, of ventilation, of cleaning, not to mention those of immediate arrangement of the object in association with others to show habitat, cultural or other relationship.

Thus far the services required for objects actually on view already clamor for much space. The matter of lighting alone is a huge problem, so well handled now by the illuminating engineers that architects can profitably rely upon them. Yet beyond all this lies the final, the real purpose of all museums, which is educa-



FIRST FLOOR PLAN

BASEMENT PLAN

EXTERIOR VIEW AND FLOOR PLANS OF MEMORIAL ART GALLERY, ROCHESTER, N. Y.

tional. Considered as an active principle, this is a fairly recent conception of museum work, but it is now a recognized field of activity and patently must be the primary function of museums. The modern museum needs classrooms, lecture hall with stage and projection booth and at least the chief items of equipment for dramatic productions; it maintains special study rooms for advanced stu-

Entrance Foyer Looking into Sculpture Hall
MEMORIAL ART GALLERY, ROCHESTER, N. Y.
McKim, Mead & White, Architects

dents; it has lending material which, in turn, requires storage and repair space; it is often a publisher and distributes books, monthly and other serial publications in its own name, possibly produced by its own printers in the building; it has a photograph department, demanding studio space, special work and storage space, dark room and other equipment.

This is a large machine, actually a plant

Fountain Court Looking North

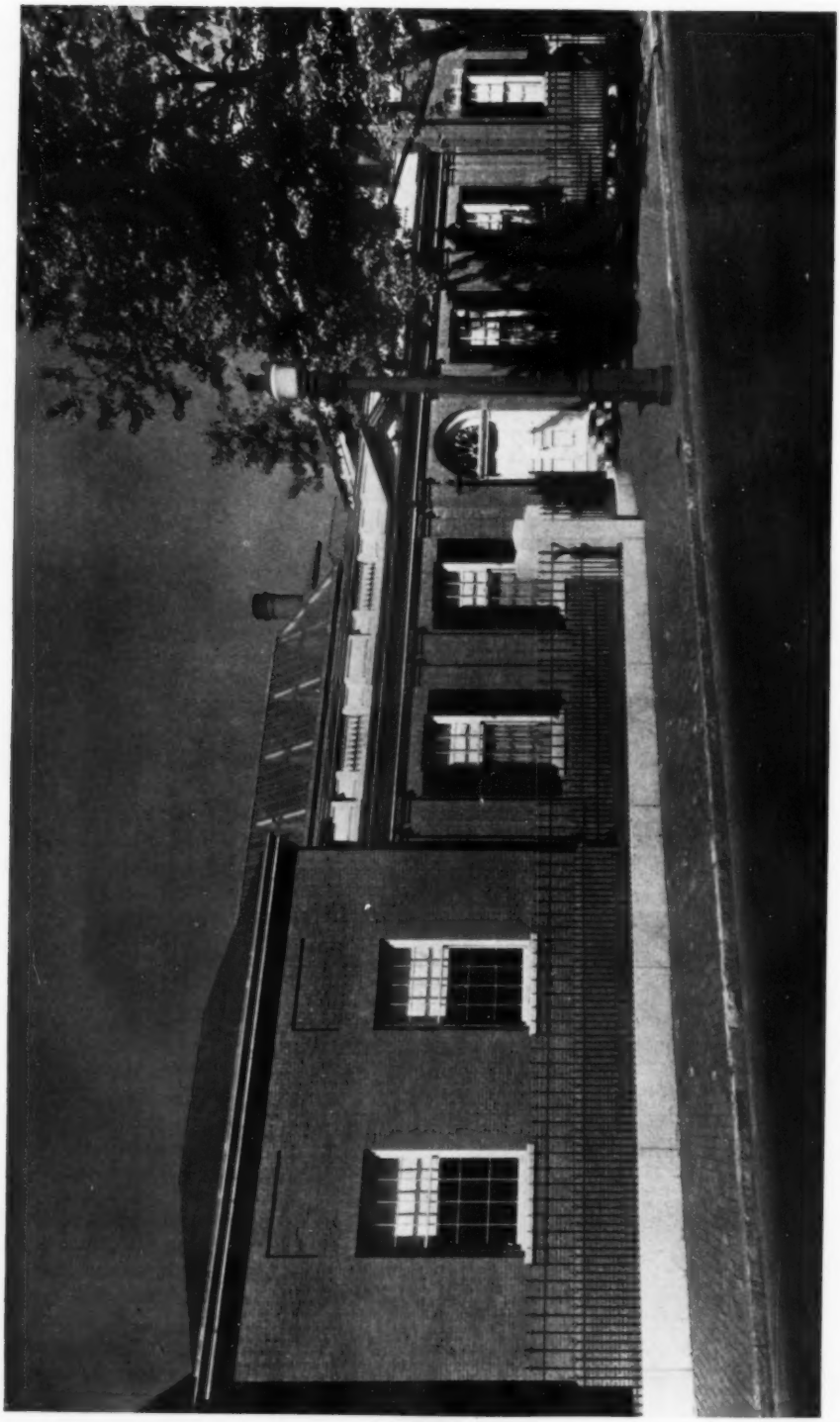
Little Theatre
MEMORIAL ART GALLERY, ROCHESTER, N. Y.
McKim, Mead & White, Architects

Italian Gallery

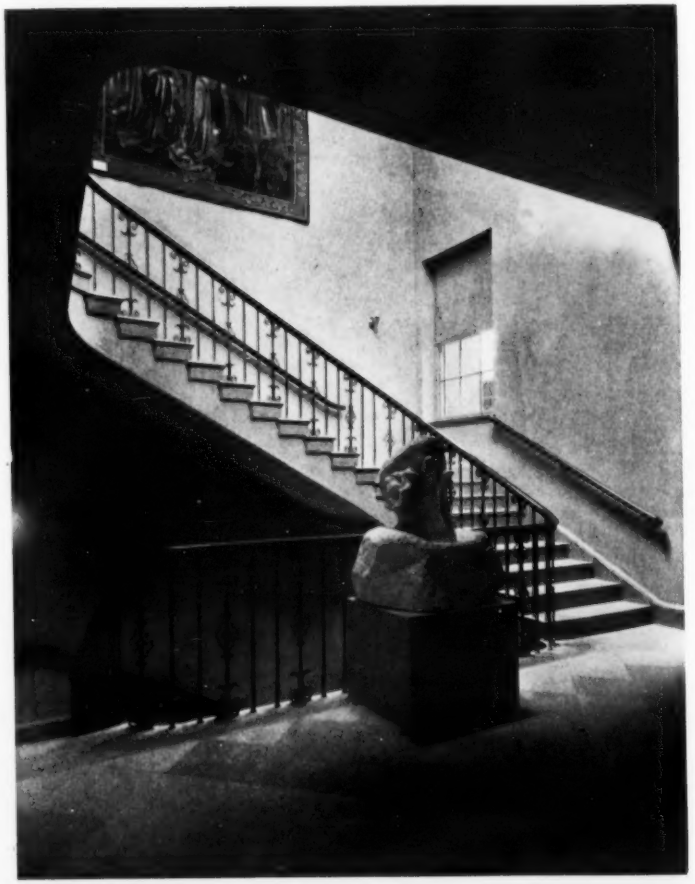
Chinese Gallery

MEMORIAL ART GALLERY, ROCHESTER, N. Y.

McKim, Mead & White, Architects



A NEW MUSEUM BUILDING FOR THE SCHOOL OF DESIGN, PROVIDENCE, RHODE ISLAND
William T. Aldrich, Architect



DETAILS, INTERIOR OF THE NEW MUSEUM BUILDING FOR THE SCHOOL OF DESIGN, PROVIDENCE, RHODE ISLAND

William T. Aldrich, Architect

A CORNER IN THE WORCESTER ART MUSEUM, WORCESTER, MASS.
Earle & Fisher, Architects

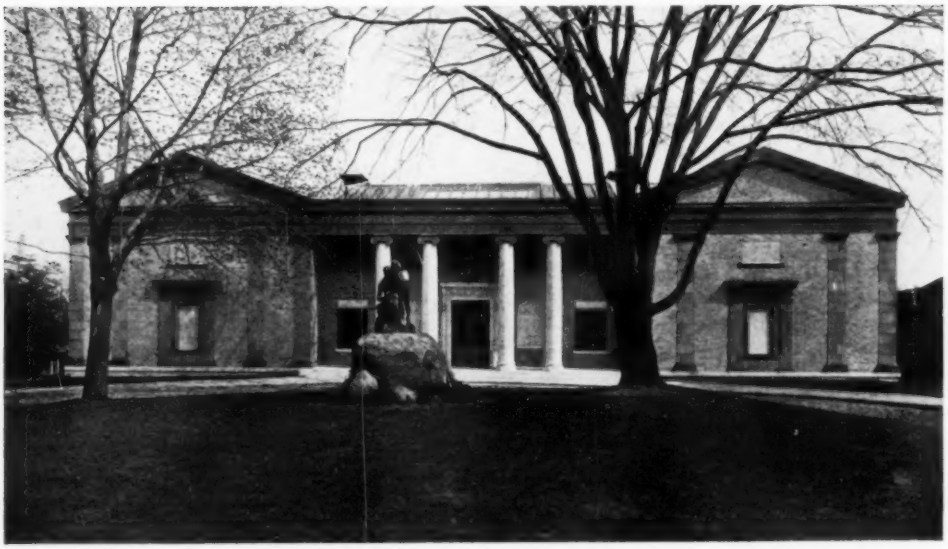
in an industrial sense. It makes heavy demands for administration, itself a consumer of much floor space. Class-rooms and other services to the public make large claims upon all the utilities in addition to space requirements; lecture halls must have direct street connections; guards and other employees require locker rooms and other facilities. Larger museums have found it advisable to conduct their own lunchrooms. They also do most of the work required in preparing and installing objects, in making alterations in interior construction, thus adding the further requirement of workshops for carpenters, painters, engineers, plumbers, plasterers, upholsterers, electricians, masons, casemakers, and others,—in a very large building, even roofers. In science museums large rooms are needed for sculptors, taxidermists, for setting up groups, etc. Finally, any museum is incomplete without its own library; in fact there may be several, these being in the nature of departmental research libraries.

The modern museum is a highly developed organization of specialists: explorers, lecturers, preparators, photographers, instructors, curators, painters, taxidermists, editors, to mention only a few according to function rather than by the names of their scientific or other specialties, such as curator of oölogy, or curator of arms and armor, or research associate in textiles.

In the light of these considerations it would seem that more adequate interpretation must be accorded to the conception of museum purposes usually stated in the triad: exhibition, preservation, education; or in another triad: investigation, instruction, inspiration.* These "slogans" mean much to the architect with a museum problem to solve, for, with but few exceptions, existing museum buildings are very expensive though elegant examples of what to avoid. He must begin with this new educational creed of the museum

INTERIOR OF THE SAN DIEGO ART MUSEUM, SAN DIEGO, CALIFORNIA
William Templeton Johnson, Architect

*The first according to Benjamin Ives Gilman, for many years Secretary of the Boston Museum of Fine Arts; the other according to F. A. Bather, Editor of the British Museum Association Journal.

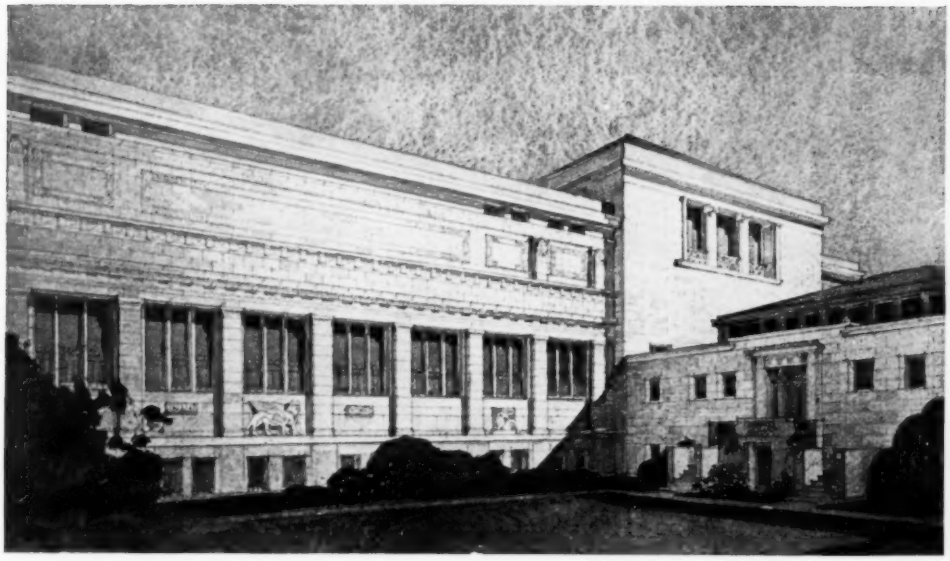


General View and Plan of the
MONTCLAIR ART MUSEUM, MONTCLAIR, N. J.
Goodwillie & Moran, Architects

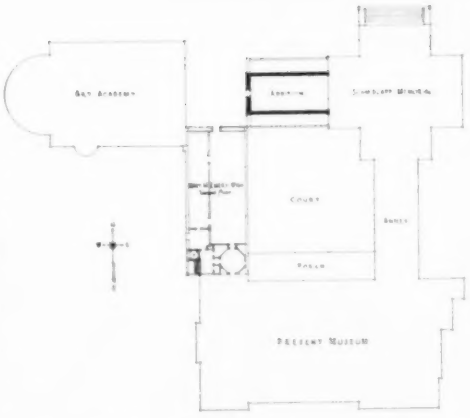
and make sure he gives it ample working space. He must allow elbow room for the many museum workers, whose offices, study rooms and shops have usually been haphazard afterthoughts instead of definite factors in a functional plan. He must account adequately for storage and for mechanical and other services. He must provide a building which has not only beauty of appearance without but matches this with the beauty of use within. That last, for instance, not in terms of railway terminal circulation which provides grand vistas of arches, vaults and colonnades, but of practical short-lines to abbreviate the journeys of visitors and reduce the handling of objects within the building, or perhaps to bring the curator's office nearer the collection he is responsible for; or, again, to provide certain obvious ways of getting out of as well as into the building, and to give the public opportunities to recover from museum fag, the result of an inordinate but very human desire to conquer as many galleries as possible before closing time.

Many museum buildings, as we have them, are monuments to mistaken ideals. New museums are apt to subscribe to the same ideals, granting only small consideration to these newer functions, though recognizing them in print. New museums still conservatively proceed to make exteriors look important with architectonic display and achieve chiefly a sepulchral result burying the ideal of service for which the museum exists.

New museums still believe in great acreage of floor space, in inaccessible exits though the entrance gapes wide, in un-



friendly color schemes, in ignoring the natural human need for rest or refreshment. New museums still forget that once erected, a fine marble building is the most inelastic thing there is and that repeated reassignment of space or fireproof partitions later constructed are not as effective in meeting demands for service as is a studied functional plan to begin with.



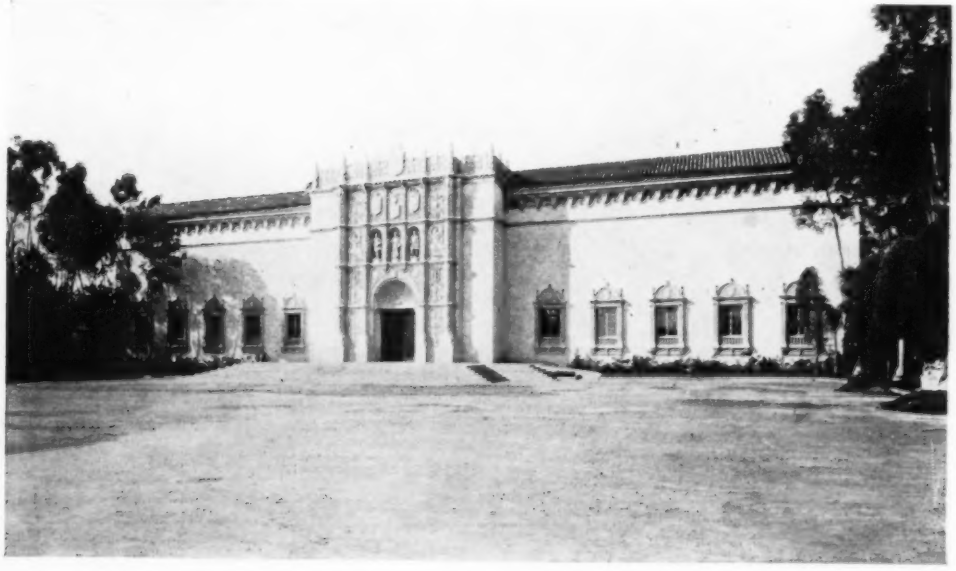
The Mary M. Emery Wing of the Cincinnati Art Museum and Floor Plan of the Museum

Garber & Woodward, Architects

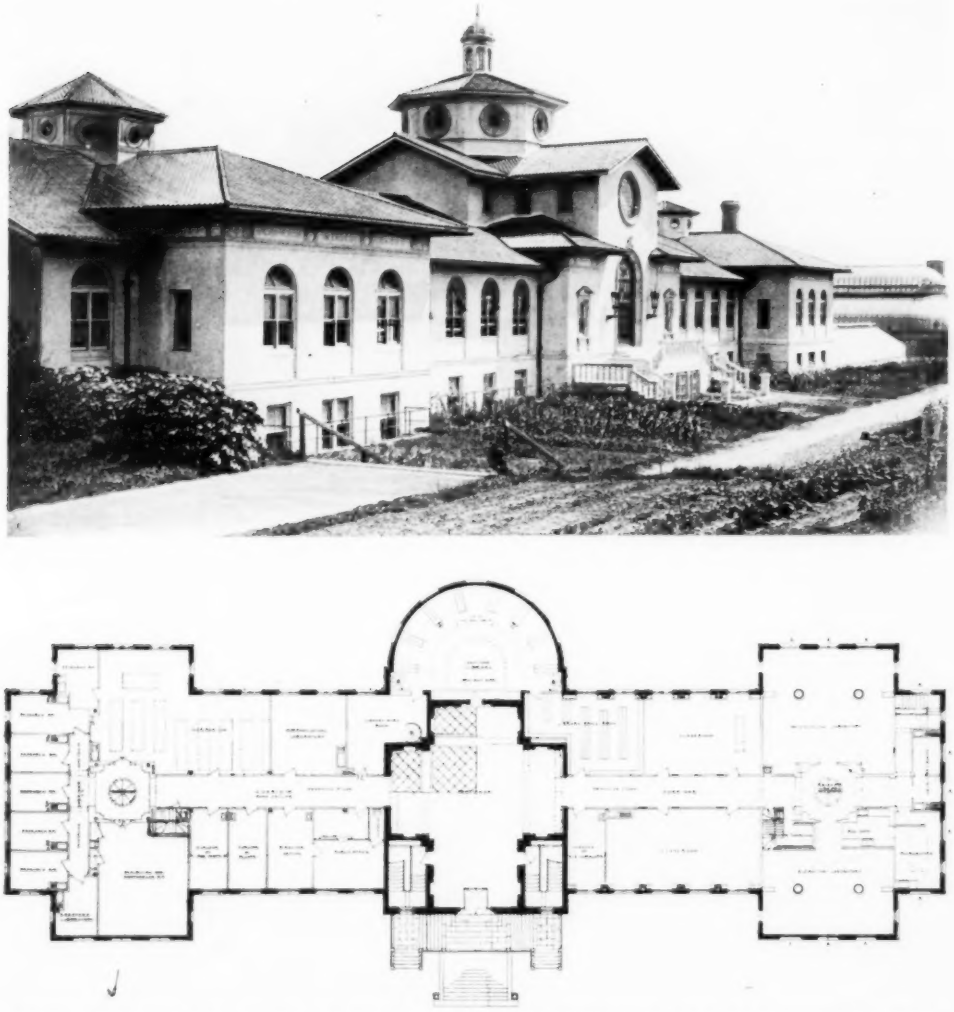
The architect must be, first, a visualizer; then a designer. His design is a vehicle for this vision which, while gradually shaping itself in his mind, remains flexible and transparent until its working requirements have been so well met and accounted for that the design is not only their outward semblance, but rather their functional expression in graceful, satisfying form.

And that form—what shall it be? General practice and tradition now make of the museum a civic monument. It figures in the civic centre; it looms large in the city plan; or it is set off with ample environment of public land. Too often this also means that the museum is set apart. One hears little or nothing of brick museums, especially for museums of art. Larger scientific and historical museums also eschew brick. The newer museum creed will see less merit in a building set apart, find more promise in a building that hobnobs with others in the crowded city. This will mean museums in taller buildings. Many future museums will be in tall buildings, unless they are public possessions or for other reasons valuable public land is set aside for their use. Church, bank, school, theatre, recreation building, university, all these have followed the business office to its rookery, and the rookery has become

ADDITIONAL WING PLANNED FOR THE SOUTHWEST MUSEUM, LOS ANGELES, CALIFORNIA
Allison & Allison, Architects; Hunt & Burns, Associates



THE SAN DIEGO ART MUSEUM, SAN DIEGO, CALIFORNIA
William Templeton Johnson, Architect



GENERAL VIEW AND PLAN OF THE LABORATORY BUILDING AND GREENHOUSES FOR THE BROOKLYN BOTANIC GARDEN, BROOKLYN, N. Y.

McKim, Mead & White, Architects

our most distinctive architectural type. The museum will follow. What shall be the design of a museum housed in, let us say, a twelve-story building? What shall be its plan? Could a museum of art be so housed at all?

In any case, the museum idea is abroad in the land. Numerous museums are projected, campaigns are under way to raise funds for many more, some large buildings are in course of construction, several important buildings and additions have been opened recently. It behooves the architect to watch this field and its building problem. We do not know by whom or for what purpose they were first used, but if we were asked for three words to cover museum work to-day we should offer: *serve and preserve*. Nor is it by accident that *serve* is written first.

The NEW AQUARIUM

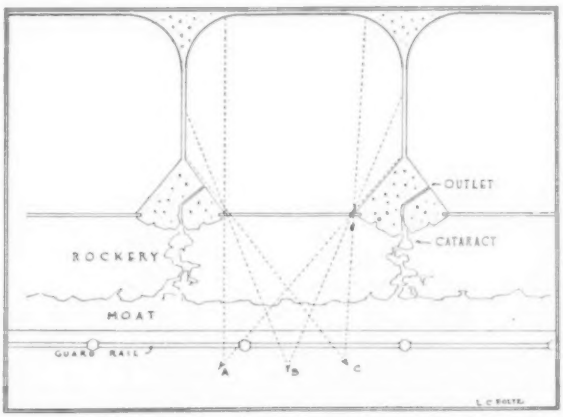
By Chapman Grant

Q. What is an aquarium?

A. An aquarium is a house with rectangular tanks in it. The tanks have one side of glass. The tanks are filled with water and have some fish in them.

Correct. Go to the head of your class.

When Capt. Noah saved the animals, the water around him must have been either salt, fresh or brackish. In any case there were a lot of fish that could not have lived in whatever the arc was floating in. Bible history has overlooked this fact and failed to give specifications of the aquaria that Noah used to save the salt and brackish water fish, or the fresh and brackish water fish, or the fresh and salt water fish as the case, overlooked by early historians, may have been. One thing is certain. That is, that there has been no improvement in aquariums since his day and the newest and most "modern" has been patterned after his.



Plan, showing that the observer must move from A to C to "take in" the entire tank

It is a strange thing that the drapers and grocers have learned to study the psychology of the passerby and to arrest his attention by making the most of a visual appeal. The museum has learned that there is little interest in line after line and case after case of stuffed birds like pictures in a rogues gallery. I say that the museums have learned this with the notable exception of their shell collections which are still on a par with collections of stamps, coins, or marbles. How about the aquarium? It still, from the oldest to the newest is modelled after the rows of pickle bottles in the grocer's store room. No thought has been given to the psychology of the observer.

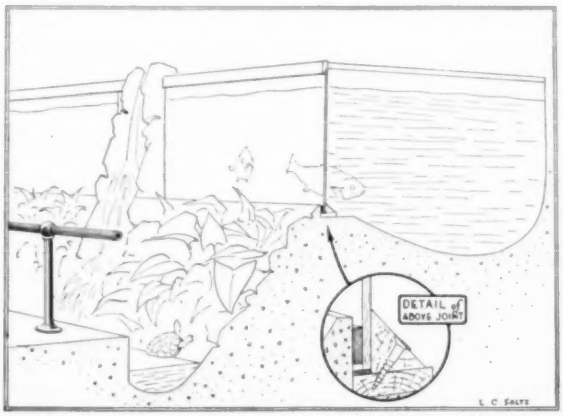
Every one contemplating building an aquarium has "studied" existing aquariums and there has never been any original thought given to the subject. Well-meaning architects or politicians or park commissioners have made interesting junketing trips to "study" existing aquariums. Not even a mouse was born.

Study and experience for many years have convinced me that the average spectator has little conception of the size of an institution that he visits. A person who has seen the tiny aquarium in Honolulu and the New York Aquarium often asks whether the former is not larger than the latter. Most observers remember the Honolulu, the Manila or the Naples aquarium as the finest, even though they have seen the New York Aquarium. This phenomenon struck me early in the game and I tried to reason it out. I believe that this is the answer. The *quality* of the exhibit remains

in the mind; size is lost, particularly where it is accompanied with fatigue and unaccompanied by either a vivid appeal to the color sense or to the curiosity. Walking a person for an hour over hard tile floors does not place him in the frame of mind for pleasurable recollections. The small aquariums of Honolulu, etc., have few exhibits, but very beautiful ones and the time required to "see" them is so short that no fatigue results and a pleasurable memory remains.

My aquarium plan calls for tiered benches from which to view the tanks. They are placed in such a position that the flow of hurried observers is neither checked nor obscuring.

Every aquarium extant has tank after tank with nothing intervening but the partitions between them. You can see all parts of any tank by glancing into it. Would an artist hang pictures like wallpaper, frame to frame? My design shows wall space between tanks, yet does not lose space in the building or tanks. A tank that opens up vistas as the observer *peers* into it. It cannot be taken in at a glance in its entirety by the casual passerby. The passerby of the present aquarium is numbed by a succession of blurred images with no break between pictures. A passerby who is longing to get off his feet. In my plan the interval between glass fronts may be variously treated. It may be a bare wall suitably tinted or it may be in the form of a niche with a cascade flowing down it through rockwork and growing plants. Again it can be in the form of a buttress—plain or decorated with the special mission of cutting off the view of the next succeeding tank until the observer is in the proper position to receive the full benefit. Any of these treatments serve to rest the eye and prepare both for the next delightful surprise.



Section-perspective of new tank. The details of circulation have been carefully worked out but are not shown here

Every aquarium extant has railings in front of the glass fronted tanks. It is necessary to keep the vandals from scratching the glasses with diamonds and the thoughtless from tapping against the glass "to see the fishes swim." The railing arouses a subconscious resentment in the observer that he is being kept away from what he wants to see. I have designed a tank that gives the observer the feeling that the railing is for his protection and arouses his interest and cooperation. Between the railing and the tank fronts I have a plant bordered moat with rockwork setting, for the exhibit of turtles., amphibians, etc. This lends perspective and the setting can be appropriate to the tank exhibit.

For the design and use of the tank itself I have studied the places where fish like to "lie" and have designed tanks so that the fish can be "thrown" wherever desired. Thus the tank has its deepest place towards the front or back according as to whether it is to contain large or small fish or to carry out whatever scheme is deemed most striking. The fish will "lie" over the deepest water in most cases. Exceptions are differently treated.

Another point I have observed is that the public's sense of size is comparative. Thus the moon looks larger to us when near the horizon because we compare it with other objects, although it is really further away from us by about half the diameter of the earth than when overhead. Now the usual reaction of an

aquarium director is to place his large fish in his large tanks and his small fish in his small tanks. A moment's thought will show that this is the wrong thing to do and that the size of the large fish is dwarfed and that the "swarm" effect of the small fish is not exploited. Thus I place the large fish in the small tank and vice versa. Result: "My, what a big fish" and "What a swarm of little fish." Had the exhibits been reversed the entire effect would be lost. A small tank suits most large aquarium fish nicely as few large free-swimming fish will live in an aquarium any length of time.

One of the most interesting things in Nature and the hardest to study in the field is the action of fish in waves, surf or strong currents. No aquarium has shown this although the amusement park man has his artificial "breakers." I have designed a tank showing surf in cross section and it would be a "knock out" from the point of view of the public. It is a simple matter to exhibit both breakers on a beach and wave action among grass covered rocks. Each gives a wonderful effect. There is no marine scene more beautiful than the California marine "goldfish" appearing and disappearing as the dark green sea grass whips gracefully, languidly back and forth. It gives the impression of ripe oranges glimpsed as the breezes stir the rich foliage.

Every aquarium has the whole front of the tank of glass. This loses the most important interest producing element to the public—that of curiosity, mystery. The bottom of the tank should be considerably lower than the bottom of the glass, and the sides should widen out as they recede from the glass. Boards may be placed above and around the edges, throwing the sides into shadow. Then the fish swim out of sight into the shadow and back again giving the impression of limitless ocean. A tank of this shape cannot be "taken in" by one comprehensive glance. It requires peering. New vistas unfold before the moving observer. The charm of the unknown lies there. A puzzle picture—"How many fish can you see?"

In a tank of this model the full head of water is not against the glass. The advantages are that lighter glass may be used. In case of breakage only part of the water and few fish escape. To clean the glass the water may be let down below the bottom of the glass without disturbing the fish, the glass cleaned and the tank refilled. It is imperative that, to insure their long life, fish once acclimated should not be moved.

MURAL IN THE LOBBY OF THE ILG ELECTRIC VENTILATING COMPANY'S BUILDING, CHICAGO

Edward Buk Ulreich, Painter

More Ornament *from* Magic Squares

By Claude Bragdon

THE PUBLICATION of "Ornament from Magic Squares" in the December, 1926, number of the Record has produced reactions which justify a sequel, illustrated by new examples. One correspondent, Mr. Paul V. Stewart, calls my attention to a fact of particular interest, namely, that a magic square may contain not one magic path only, but several, thus enormously increasing the richness of a field already rich in possibilities for the designer of ornament.

But, for the benefit of those readers who now come upon this subject for the first time, before we again plant our metaphysical spade into this "pay dirt," it will be desirable to re-state the point of view from which these essays and "Projective Ornament" are written—to sketch in the philosophical background, in other words. For although it is true, as Schopenhauer says, that the concept is unfruitful in art, it is also true that a sound aesthetic must be severely reasoned. The rationale need not be known, necessarily, to the creative artist, but he responds to it, just as the magnetic needle northward points, though it knows not the pole.

The characteristic forms which our architecture is assuming are determined by economic, practical, and structural necessity into which the element of inevitability enters to such a degree that it subdues and even overrides the architect's merely personal expression; it is a check, but at the same time it is a guide to what he should do. When he is confronted with the problem of ornament, however, no such necessity restrains or directs him, for the problem here is not practical, but psychological. From Egyptian ornament can be read the habits, tastes and beliefs of the dwellers in the Nile valley thousands of years ago; the adornments of a mediaeval cathedral constitute a veritable bible of the Christian faith, but we moderns have not developed any ornamental mode whereby we are able to express our habits, tastes, beliefs, our faith or our unfaith—unless indeed our adoption of dead modes expresses unfaith in ourselves. The architect is therefore at a loss; he must either create ornament out of his inner consciousness—a thing possible only to the supremely gifted, and with them a necessarily personal expression—or he must copy the ornament of alien or ancient civilizations expressive of their psychology and not ours.

Either of these alternatives is so bad that the wisest course is perhaps the one sometimes adopted: to dispense with ornament altogether, leaving the building's stark geometry unfretted by any personal signature, and undraped by the grave-clothes of dead styles. But such a procedure is successful only in certain cases; a factory, an office building, a grain elevator or a storage warehouse can be conceived of without ornament, but how about a club, a theatre, an apartment hotel? Do not these seem to call for some expression of their function more graceful and articulate than their mere form and fenestration are able to show forth?—do they not demand an ornamental mode, in point of fact?

And when we turn from architecture to the allied and subsidiary arts of space the need is seen to be indeed imperative. At present this need is met by universal and unashamed copying of the past: the library and the museum are the places

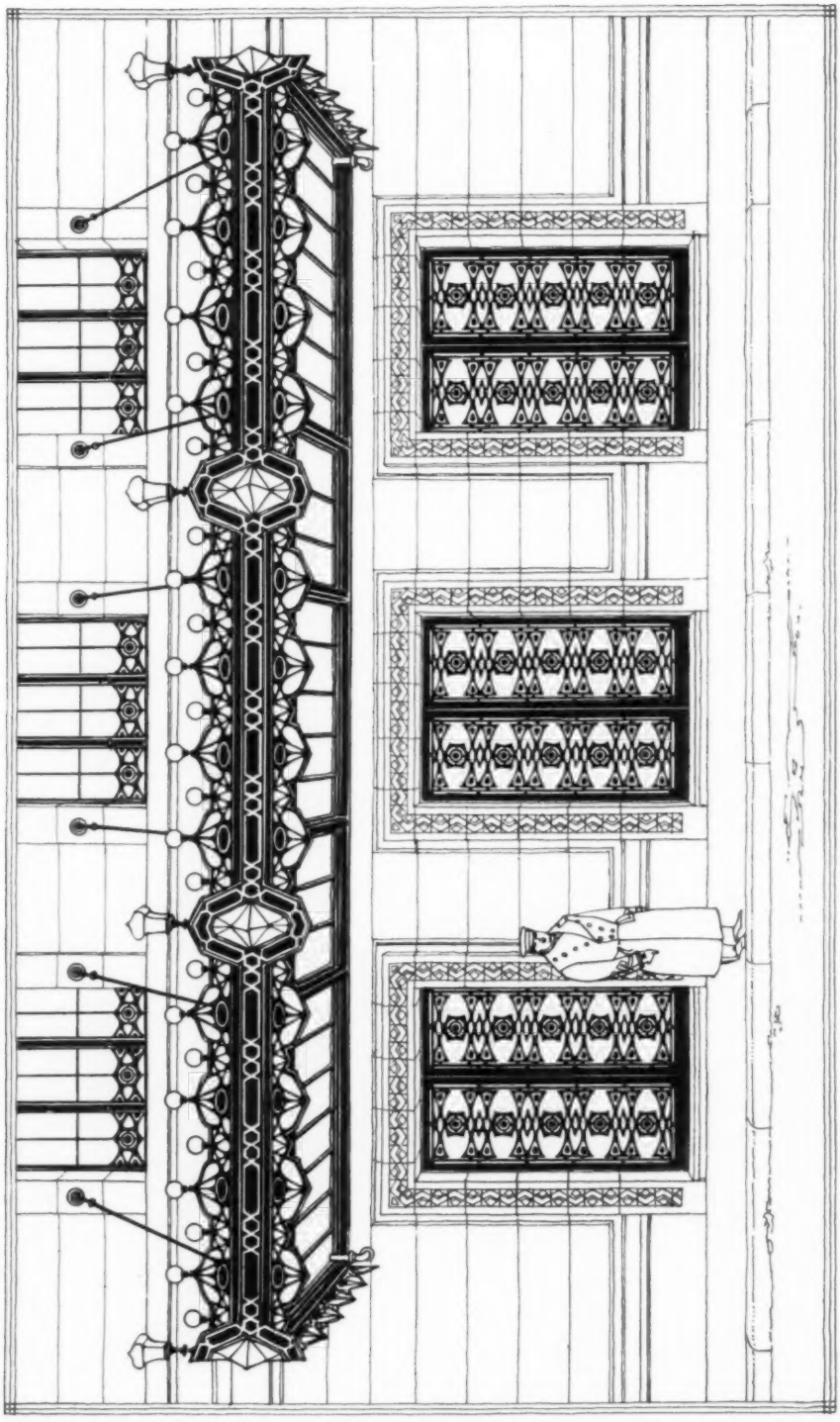


ILLUSTRATION 8

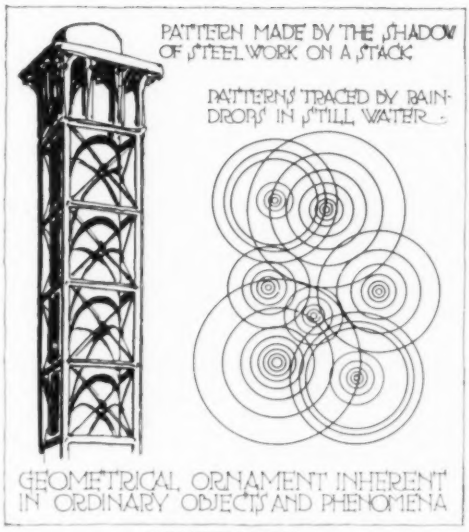

PATTERN MADE BY THE SHADOW OF STEEL WORK ON A STACK
PATTERNS TRACED BY RAIN-DROPS IN STILL WATER
GEOMETRICAL ORNAMENT INHERENT IN ORDINARY OBJECTS AND PHENOMENA

ILLUSTRATION 1

from which all of the little pitchers are filled with these stale waters instead of from the creative imagination whence wells up the Water of Life. The worst feature of it all is our universal good conscience about the whole matter, and this complacency is fostered by a kind of instruction wherein lying and stealing are professed from university chairs.

But why waste words on that which is self-evident, or wax bitter over a condition of things which is after all only another sign of the general "fatness of these pursy times?" Let us rather set to work to remedy this condition—that is, let us endeavor to discover some source of ornament which we can make our own—and make it our own, by a process of development in which everyone may have a part. For the vice of all aesthetic endeavor now-a-days is its lack of unity of aim and direction; there is no goal, no agreement, no concerted effort—we have only a mudpuddle full of croaking bull-frogs instead of a broad and silent river, fed by hidden springs, flowing forever onward toward some profound and pacific sea.

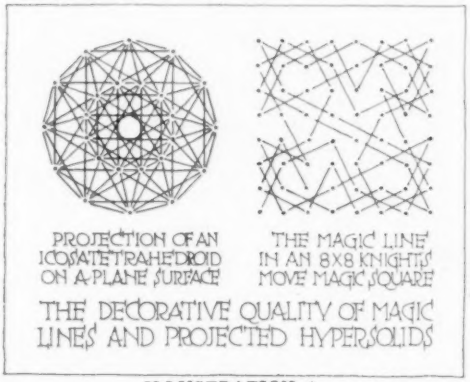

PROJECTION OF AN ICOSATETRAHEDROID ON A PLANE SURFACE
THE MAGIC LINE IN AN 8X8 KNIGHT'S MOVE MAGIC SQUARE
THE DECORATIVE QUALITY OF MAGIC LINES AND PROJECTED HYPERSOLIDS

ILLUSTRATION 2

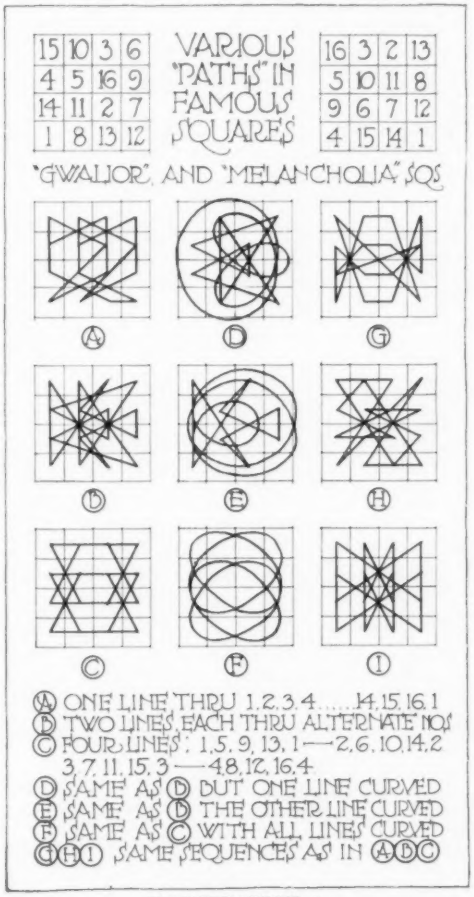


ILLUSTRATION 3

The most obvious source of ornament is the natural world, but is it for us after all the right one? Many ornamental

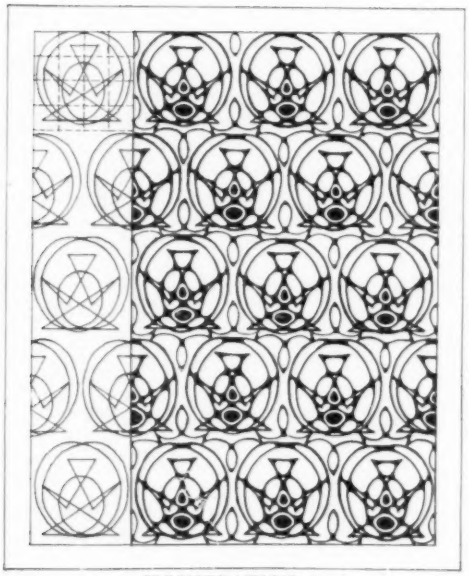


ILLUSTRATION 4

modes have been evolved by "straining" the flora and fauna of a country through the creative consciousness, from which it has emerged transmuted into an ornamental mode. But the modern world is not bucolic, but urban: its flora are factory products and its fauna are Fords. Our cities are Euclidian—one may wander for hours in New York or Chicago without seeing a tree or a blade of grass, and even the country roads are lined with gigantic advertisements of the products of our industrialism. We are alienated from nature, and she is therefore strange to us, but there is another possible source of ornament with which we are utterly familiar: mathematics, for it is the *sine qua non* of all our science and civilization. Education in mathematics has accordingly become universal and the last half century has witnessed an unprecedented extension of the science itself. Furthermore, in going to mathematics we are not going away from nature but towards her—or rather, *behind* her—for "nature geometrizes" not alone in the spider's web, the bee's honey-cell and the snow crystal, but in her most intricate arabesques. All natural forms whatsoever submit themselves to a mathematical synopsis so precise that one is forced to the conclusion that number is the thread on which everything in the world, and the worlds themselves, are strung.

To derive an ornamental mode from mathematics is of course no new idea; it has been done before, notably by the Moors, those skilled arithmeticians; but in mathematics we have an inexhaustible source, the matrix not alone of the old, but of the new. At odd intervals during the past twelve years I have busied myself with this endeavor to extract a system of ornamentation from mathematics, and am today more than ever convinced that the direction is right and that the results are sure. What is now needed is a consensus of aim and a community of effort; this is not properly the task of a single individual, each should bring his little store of honey to the general hive.

The methods of approach are many: one has only to re-focus his eyes, so to speak, in order to discover beautiful mathematical designs in the most ordinary objects—the reflections on a white table cloth from a glass of water, the shadows on a ceiling from a chandelier. Only the other day I saw an admirable

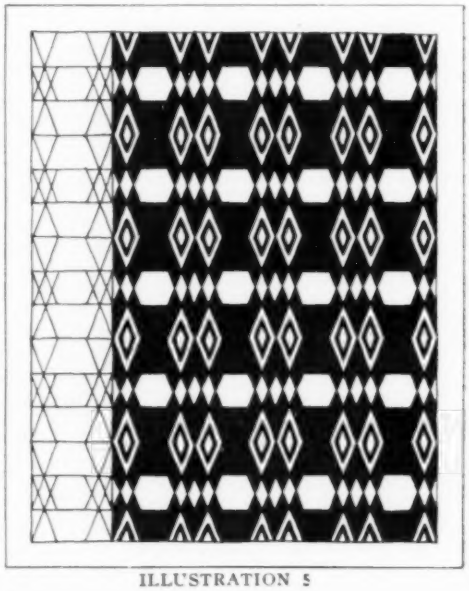


ILLUSTRATION 5

decoration etched on a circular stack by the shadow of its enclosing steel work, and on another occasion I noted the extraordinary beauty of those concentric and intersecting circles made by rain drops in still water (Illustration 1).

But in order to find what we are really after it will be necessary to go behind the purely phenomenal, and tap sources more universal and abstract; we must needs concern ourselves less with the *world-aspect* than with the *word-order*—and this is done by closing the bodily eye for the time being, and opening the eye of the mind. Mathematics symbolizes and epitomizes the world order; it contains the pattern of the universe and of its every part. If the astronomer wants to know where to point his telescope to look for a comet, or if the chemist wants to know the number and arrangement of atoms in a given molecule, each appeals to mathematics to find out. It was by delving into that mysterious demesne, the fourth dimension—"the world of the wondrous"—that the potentialities of mathematics as a source of ornament revealed themselves, for I found that the projection on a plane of a symmetrical

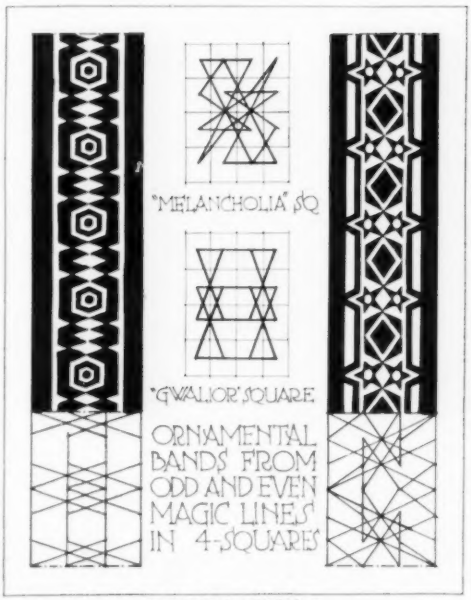


ILLUSTRATION 7

hypersolid, besides being interesting to the mind, was fair to the eye; and later, in studying that other mathematical mystery, the magic square, I discovered in their magic paths an infinitude of ornamental motifs. (Illustration 2).

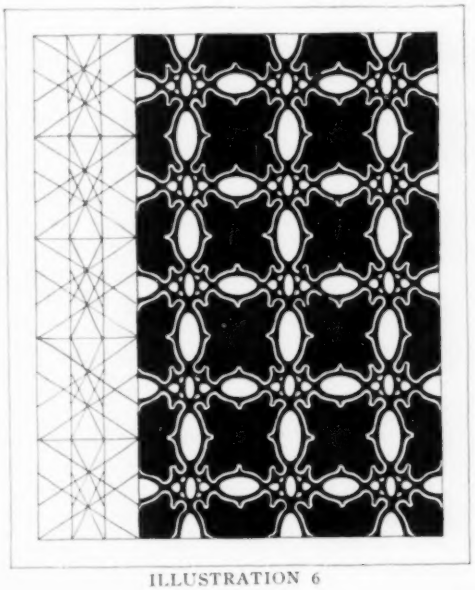


ILLUSTRATION 6

Magic Squares formed the subject of my previous essay, as they do of this one. For the benefit of the uninformed reader it will first of all be necessary to tell again what a magic square is, and what a magic line. A magic square is a numerical acrostic; the terms of any progression of numbers arranged in square form in such a manner that the vertical, horizontal and long diagonal columns add to the same sum. These are the minimum requirements; there are magic squares which while fulfilling, transcend them to such an extent that they have been given the name of "super-magic" squares. A magic line is the endless "path" developed by following the numbers from cell to cell of the square consecutively, in their natural order, and from the final number to the first one. This path makes a linear pattern. Because the numerical arrangement which it shows forth is it-

self ingenious, sometimes the pattern is symmetrical, and often, symmetrical or not, of great intrinsic beauty. Now these "necessitous" lines, dealt with by the designer, have the power to stimulate, and at the same time discipline his creative imagination. By their aid he should be able to produce decorative motifs without grave-damp on them —"a consummation devoutly to be wished."

Let us now explore some of the new possibilities opened up by Mr. Stewart's so interesting suggestion that in addition to the many magic arrangements of any given sequence of numbers, each of which yields a different magic line, any single magic square yields not one magic line only, but several. Mr. Stewart says in his letter, "I bring to your attention the lines derived by tracing out alternate odd and even numbers as well as other sequences, depending upon the order, or size of the square . . . I have found that some squares, especially those of four, which do not yield particularly interesting lines by tracing the numbers consecutively, will yield interesting lines by various other methods." He proves his point by a series of diagrams which I have epitomized in Illustration 3. He uses only two squares, both of them shown in my first article, the "Gwalior" square, so called because carved in Sanskrit characters on the gate of the ancient fort at Gwalior, India; and the "Melancholia" square, introduced by Albrecht Dürer in his famous etching of that name. From these he develops not two, but nine linear patterns, each one fertile in suggestion to the designer of ornament.

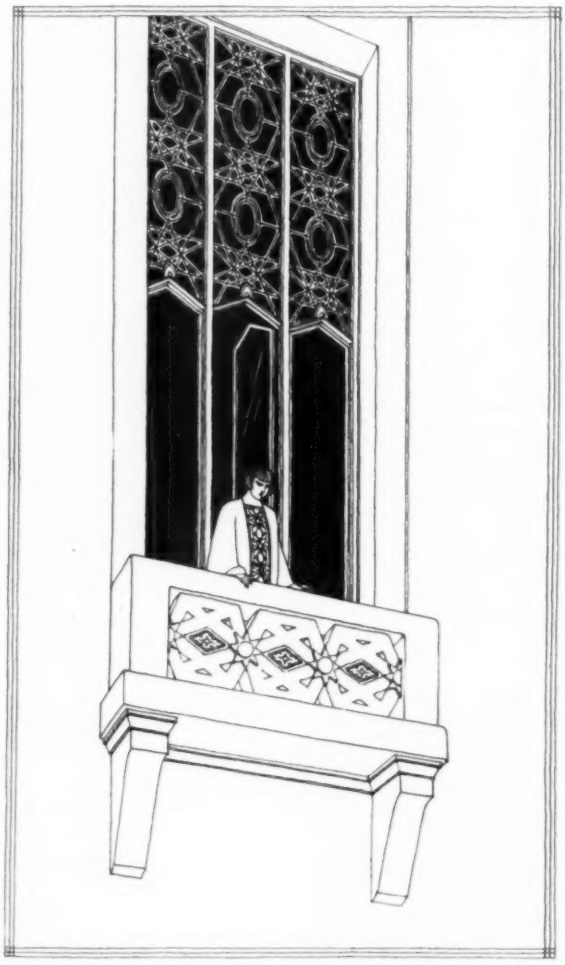


ILLUSTRATION 9

In the remaining illustrations I have dealt with this material in my own way, using only these lines, and not all of them at that. This is eloquent testimony to the richness of the field here opened up—for there are nearly three hundred different magic 4 x 4 squares alone, and the decorative possibilities of only two of them still remain unexhausted.

By referring to Illustration 3 it will be noted that the paths are of three kinds. *First*, the regular magic line developed according to the terms of the definition of it previously given—a following of the numbers in their natural order; 1.

2, 3, etc., and back again to 1. *Second,* the two lines in a single square developed by following the odd numbers in sequence, and the even numbers similiarly; 1, 3, 5, etc., and 2, 4, 6, etc.; and *third,* the four lines developed by using a greater, but always constant numerical interval, producing, in this case, the sequences 1, 5, 9, 13, 1; 2, 6, 10, 14, 2, and so on. In the light of all this our definition of a magic line should perhaps be revised to read as follows: a magic line is the endless path within a square developed by follow the numbers from cell to cell by some progression in which the interval is constant.

Where two lines are developed within a single square further pattern-making possibilities are opened up by making one of the lines angular and the other curved, that is, YO and IN—masculine and feminine—in relation to one another. The odd and even sequences within the Gwalior square, treated in this way, yield the interesting pattern 'E" utilized in Illustration 4.

It seems scarcely necessary to identify for the reader the sources of ornament in the remaining illustrations: 5 and 6 are textile patterns derived respectively from "C" and "I"; the ornamental bands shown in Illustration 7 are from "C" and "H". The source of the marquise design in Illustration 8 is more obscure; it is a free treatment of the web marked "B" elongated, repeated and reversed. A comparison of the source with the finished result should make this clear to the reader, who will have no difficulty in identifying the door design with "C". The lead-work of the window shown in Illustration 9 is taken from "I" without any modification other than translating one diamond form into an ellipse. The iron work of the gate shown in Illustration 10 is derived from "H", but in order to mitigate the angularity of the whole and for a better expression of the material employed curved forms have been introduced.

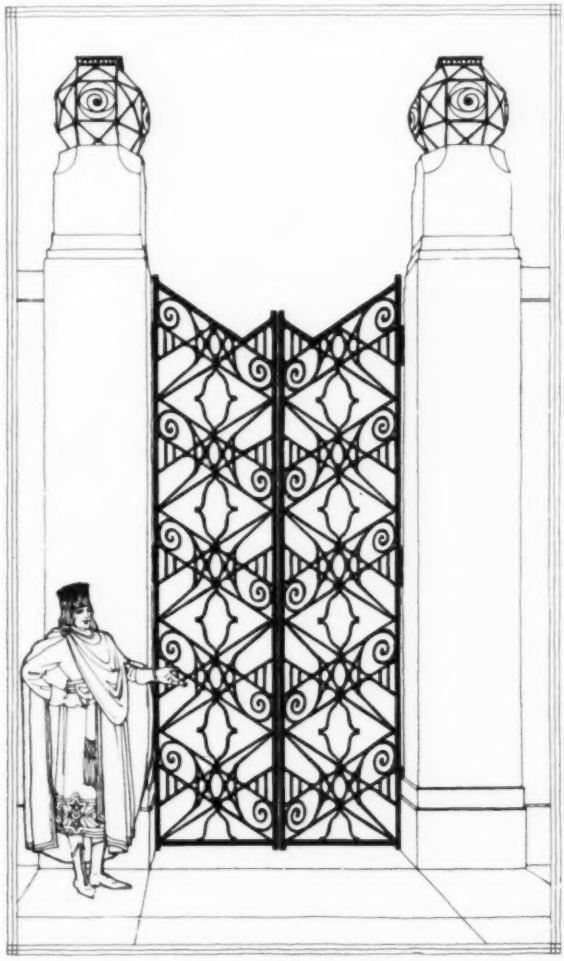


ILLUSTRATION 10

Several methods of forming odd number magic squares were described in the antecedent essay, but no rules were given for even number magic squares, such as the 4x4. It is not my purpose to burden this discussion with such information, easily obtainable from other sources, for

were I to go into the subject at any great length this little essay on aesthetics would turn into a mathematical treatise. Nevertheless, though I do not want to betray the non-mathematical reader by putting poison in the bottom of this cup, for the benefit of the mathematically minded and for the abatement of the curiosity of others, I am constrained to describe the simplest of all methods for making a 4x4 magic square—one not applicable, however, either to the Gwalior or to the Melancholia square.

Arrange the first sixteen numbers in their natural order in the form of a square, thus making four rows of four figures each, reading in the usual way, from left to right, across, and down. It will be noted that the diagonals of this square yield the magic sum 34, therefore the numbers which constitute the diagonal of the square must be retained, namely, the four corner and the four central numbers, and the others rejected. The place of these must be supplied by eight numbers from the corresponding cells of a square made by a different order of counting, *the reverse-ordinary*, beginning at the lower right hand corner and reading across and up. Completed in this way it will be found that all of the vertical and horizontal columns, as well as the diagonals, add up to 34. (Illustration 11).

In conclusion, let me reiterate what I have said so many times before, that here is no royal road to success for the designer, no formula for making silk purses out of sow's ears, no substitute for the creative imagination; it is only something which, used freely and masterfully, may give that imagination more powerful wings; but used slavishly and inexpertly will only add another fetter. The aesthetic faculty, the inner sense of beauty and rhythm must be the final and sole arbiter. The merit of the method consists, to my thinking, in the fact that transmutation from chaos to harmony has been achieved in the domain of the mind, numbers have been *polarized*, as it were, so that the magic square is as different from any fortuitous square arrangement of numbers as a horse's shoe is from a horseshoe magnet. This polarity is revealed to the eye by the magic line just as magnetism in a magnet is revealed by the lines of force in the surrounding iron filings.

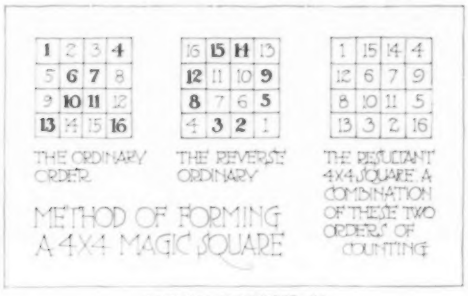

1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
THE ORDINARY ORDER
16 15 14 13
12 11 10 9
8 7 6 5
4 3 2 1
THE REVERSE ORDINARY
1 15 14 4
12 6 7 9
8 10 11 5
13 3 2 16
THE RESULTANT 4X4 SQUARE A COMBINATION OF THESE TWO ORDERS OF COUNTING
METHOD OF FORMING A 4X4 MAGIC SQUARE

ILLUSTRATION 11

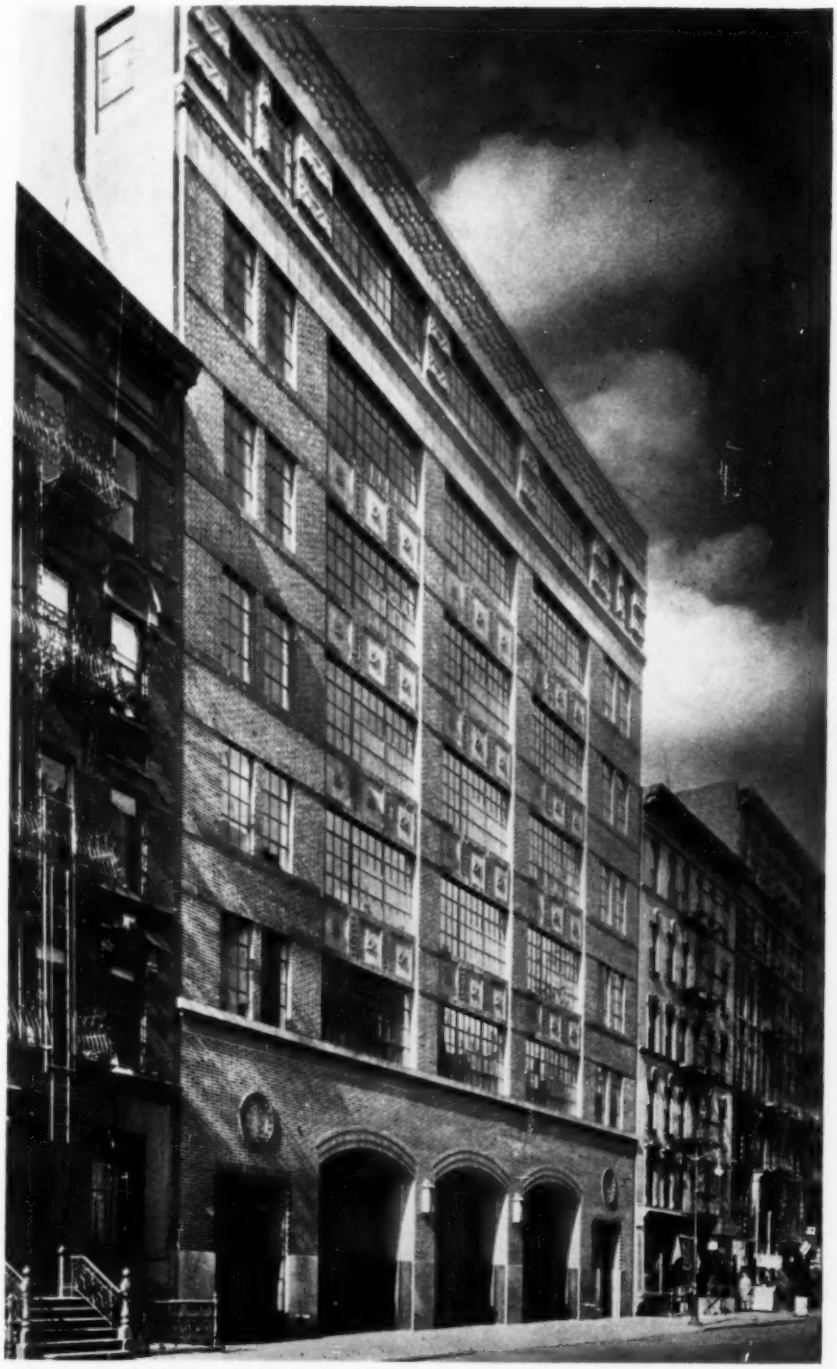
PORTFOLIO

CVRRENT · ARCHITECTVRE

THE EDWARD PINAUD FACTORY, NEW YORK CITY
Buchman & Kahn, Architects

THE EDWARD PINAUD FACTORY, NEW YORK CITY

Buchman & Kahn, Architects



Photo, Fischer

THE EDWARD PINAUD FACTORY, NEW YORK CITY

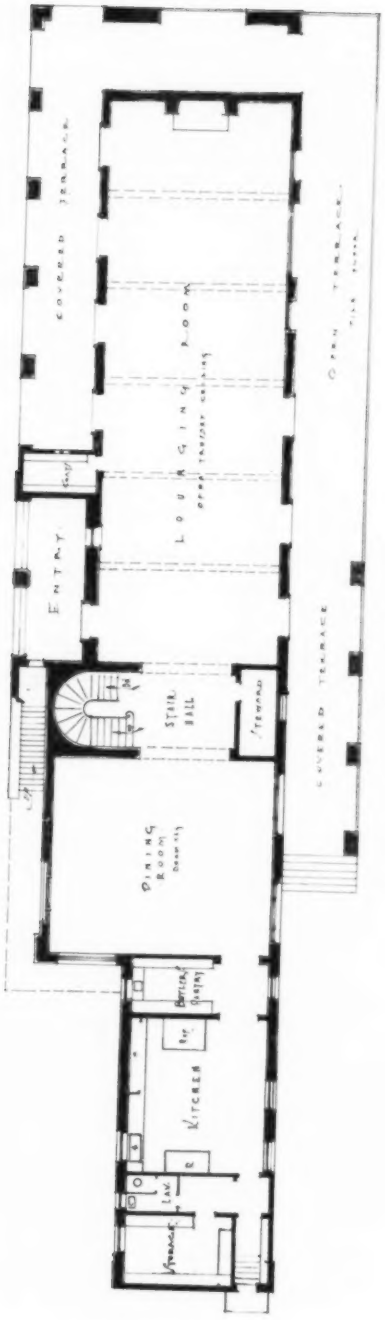
Buchman & Kahn, Architects

Photo, Gottscho

CLUB FLORIDA, NEW YORK CITY
Wm. Lawrence Bottomley, Architect

CLUB HOUSE, SAN CLEMENTE, CALIFORNIA

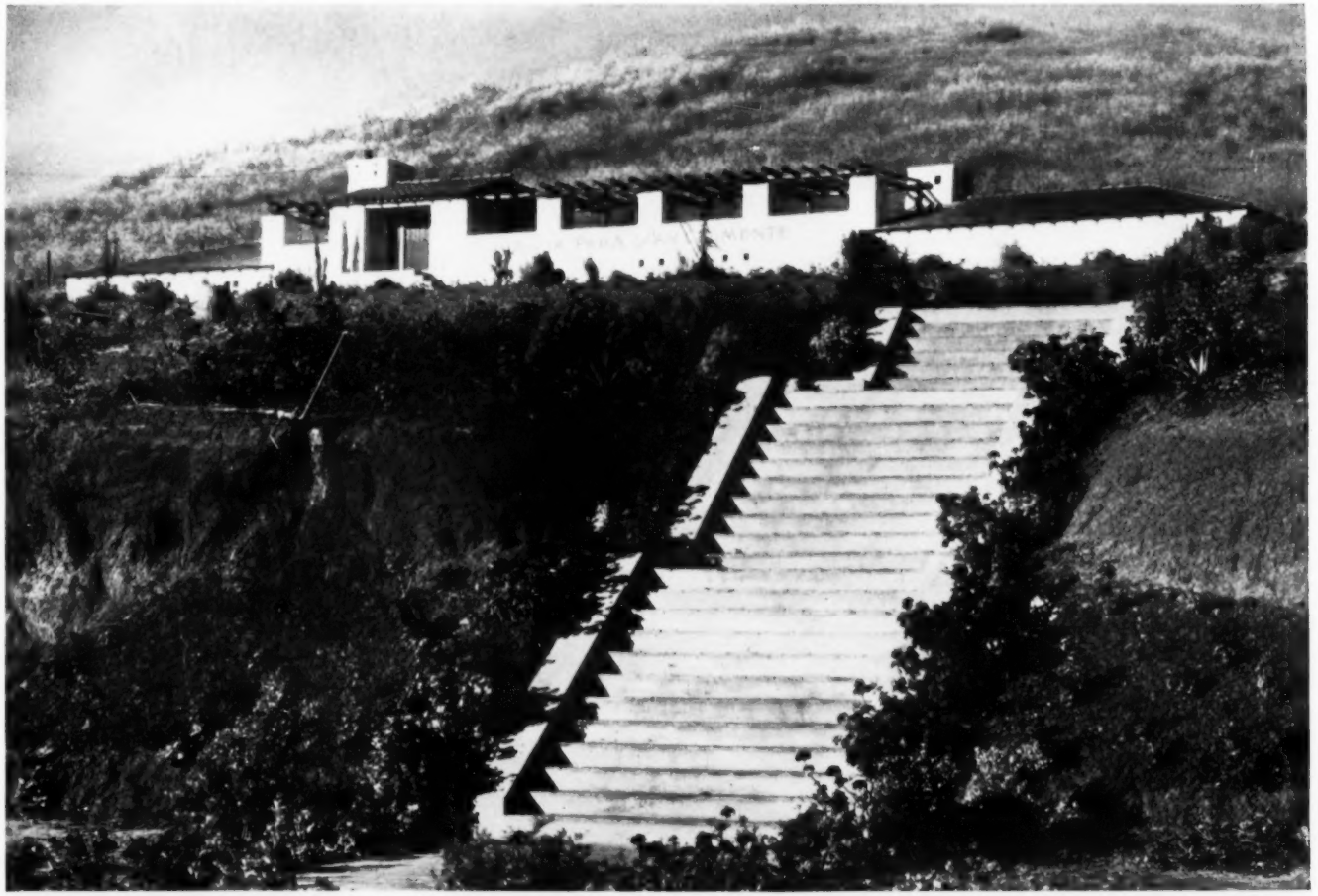
J. Wilmer Hershey, Architect
Chas. A. Hill, Associate



Floor Plan

CLUB HOUSE, SAN CLEMENTE, CALIFORNIA

J. Wilmer Hershey, Architect
Chas. A. Hill, Associate



CLUB HOUSE, SAN CLEMENTE, CALIFORNIA

J. Wilmer Hershey, Architect
Chas. A. Hill, Associate

OFFICE OF THE CLUB HOUSE, SAN CLEMENTE, CALIFORNIA

J. Wilmer Hershey, Architect
Chas. A. Hill, Associate

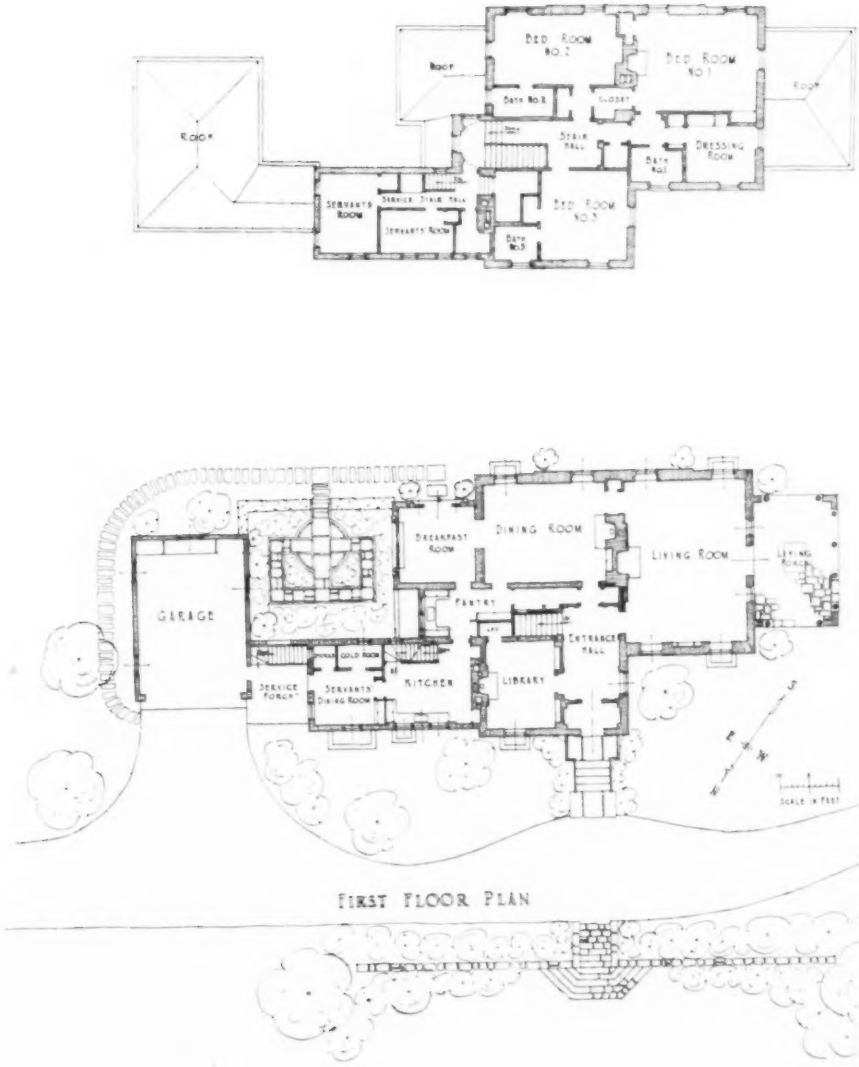
THE CARTHAY CIRCLE THEATRE, LOS ANGELES, CALIFORNIA

Dwight Gibbs, Architect

THE CARTHAY CIRCLE THEATRE, LOS ANGELES, CALIFORNIA

Dwight Gibbs, Architect

RESIDENCE OF HENNING W. PRENTIS, ESQ., LANCASTER, PENNA.
C. Frederick Houston, Architect



FIRST FLOOR PLAN

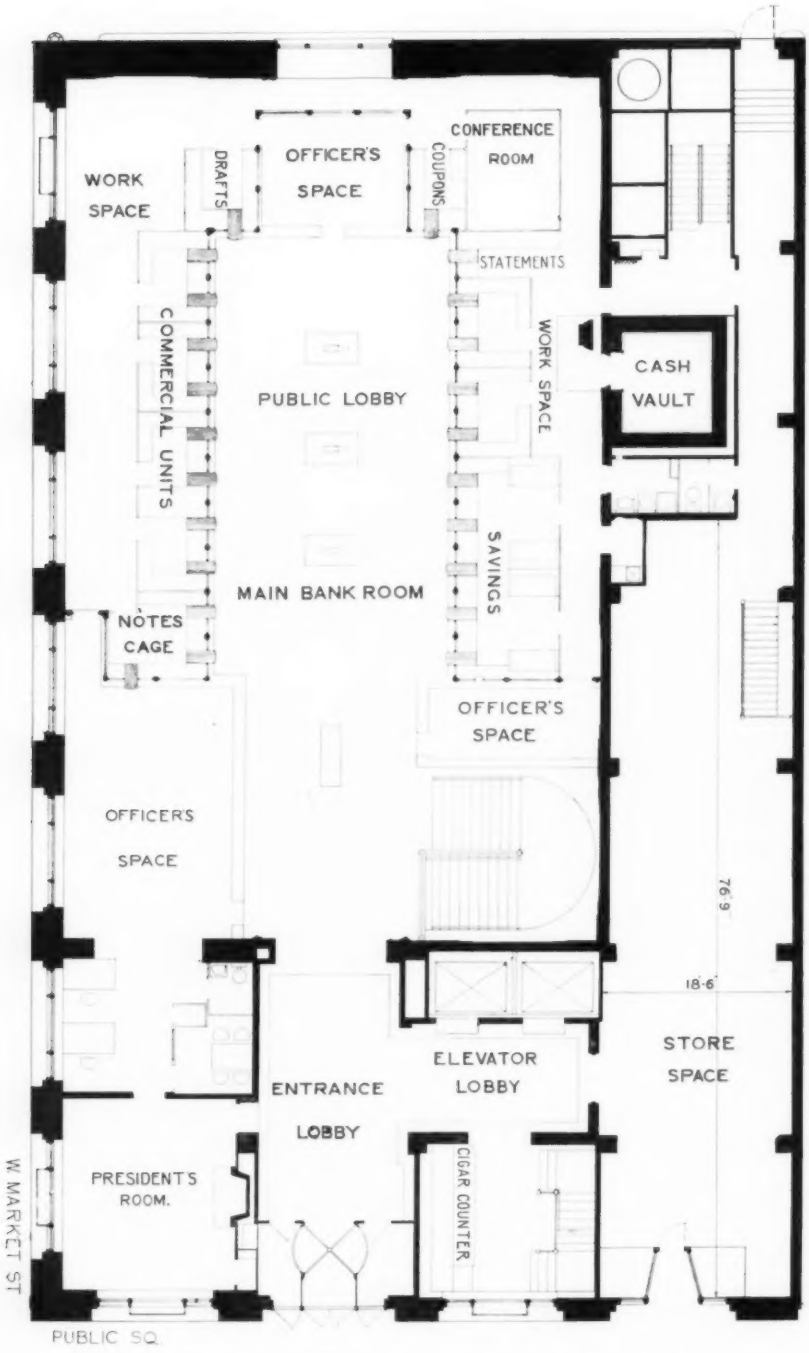
RESIDENCE OF HENNING W. PRENTIS, ESQ., LANCASTER, PENNA.
C. Frederick Houston, Architect

RESIDENCE OF HENNING W. PRENTIS, ESQ., LANCASTER, PENNA.
C. Frederick Houston, Architect

COSSITT AVENUE SCHOOL, LAGRANGE, ILLINOIS

Childs & Smith, Architects

THE LIMA TRUST COMPANY BUILDING, LIMA, OHIO
Weary & Alford Company, Architects



THE LIMA TRUST COMPANY BUILDING, LIMA, OHIO
Weary & Alford Company, Architects

THE LIMA TRUST COMPANY BUILDING, LIMA, OHIO
Weary & Alford Company, Architects

THE LIMA TRUST COMPANY BUILDING, LIMA, OHIO
Weary & Alford Company, Architects

THE LIMA TRUST COMPANY BUILDING, LIMA, OHIO
Weary & Alford Company, Architects

GREEK ARCHITECTURE AND THE CRITICS

By

A D F Hamlin

WITHIN THE LAST forty years the discovery, examination and study of the extant remains of Greek architecture, many of them wholly unknown to the earlier writers, have greatly extended our knowledge and understanding of the monuments of ancient Greece. At the same time the study of the buildings of other nations—particularly of the great monuments of the Middle Ages, and to a less degree, perhaps, of Egypt and of India—has brought about a more discriminating attitude in the critical discussion of architecture. It is coming to be realized that there are different architectural languages, providing different sorts of expression and permitting of different sorts of perfection. The poetry of form in building comprises many different modes of emotion and expression. As one's study of the world's architecture broadens, one's capacity for understanding and appreciating diverse forms of expression broadens correspondingly. The conviction grows that no one style can be crowned as the supreme and absolute exemplar of perfection, but that each of the great historic developments of architecture has achieved in certain directions transcendent results.

During a large part of the nineteenth century the critics of architecture were less tolerant, particularly those who wrote in English. These were long divided into the two main camps of the Hellenists and the Gothicists, each camp extolling one style and depreciating the other. To the Hellenists Greek architecture was the supreme model, alone worthy of study and imitation; to the Gothicists Greek architecture was cold, foreign and pagan, and the Gothic the only style worthy of being reproduced. To both groups, however, Roman architecture was alike anathema; it was base, vulgar, pagan, and unworthy of admiration on any rational ground. The reaction was complete from the Roman Revival which had characterized the closing quarter of the eighteenth century and the first quarter of the nineteenth.

The fundamental defect of this sort of criticism was its singular misconception of architecture itself. Planning and construction were almost completely ignored. Architecture was treated as a matter of exterior detail, and the singular notion seems to have prevailed that some one set or combination of forms could serve equally and for all time as a dress for any and every sort of building, whatever its site, plan or purpose, whatever the climate, the materials or the system of construction. The revivalists of both schools strove valiantly and conscientiously to dress churches and prisons, libraries, theatres, concert-halls, railway stations, civic buildings and museums, in Greek or in medieval costume, in London and Edinburgh, in Calcutta and Munich, in Washington, Boston and Philadelphia, with results which in some cases among many absurdities, compel our respect, even our admiration. But the chosen style was always, after all, little more than an external and foreign garb for buildings which were as far as possible from being either Greek or Gothic in plan, structure or interior design.

Architectural criticism has at last outgrown so childish a misconception of its problem and function, and the critical discussion of styles has reached a better understanding of its own province and methods. There still appear, from time to time, outcroppings of the old veneration for Greek architecture as something almost superhuman in its perfection, embodying esoteric mysteries which the

critic believes himself to have discovered as the true secret of a perfection otherwise unattainable. Each of these various discoveries attracts a following of enthusiastic votaries, but after a few years the volumes it has produced accumulate dust on the shelves of libraries where the interested student can hunt them up, compare them, and wonder at the ingenuity of their authors and at the multitude of the secret paths by which the Greek architects were supposed to have reached the same result. All this is very interesting and not wholly futile, in that it serves to keep in perennial freshness the public interest in Greek architecture. Meanwhile the archæologists and architects, busy in digging up, measuring and drawing the fragmentary remains of Greek monuments, are generally coming to realize that the Greeks were very much like other human beings, working in divers ways, eternally trying experiments, making mistakes and seeking to correct them, very much as we do today; tied down by tradition in some directions, ingeniously innovating in others, working toward perfection along certain rather restricted lines, but gifted as no people before them ever had been, and as few if any have been gifted since their day, with a keen appreciation of the essentially beautiful, with a rare purity of taste and above all, perhaps, with a power of self-restraint and critical judgment such as no other people as a whole has manifested since their day.

II

The history of this architecture has had to be largely rewritten during the past forty years. The first chapter of this new history, or what was thought to be its first chapter, was made necessary when Schliemann had laid bare, and his successors had further explored and studied, the pre-Hellenic remains at Mycenæ, Tiryns, Orchomenos and other sites and monuments of the pre-Hellenic or Mycenæan culture. It was at first supposed that these supplied the key to the origins of the historic architecture of Greece. But the Mycenæan differed so radically from the later or Hellenic architecture that no satisfactory link of historic development could be found to connect them. Between the mud-brick house walls of Mycenæ and Tiryns with their timber dressings, their downward-tapering columns with clumsy capitals, their surface-ornamentation and platings of bronze, on the one hand, and on the other the stone, marble and terra-cotta details of the earliest Doric temples, the transitional links were missing—and they have not yet been discovered.

In the middle 'nineties a new chapter in the history of pre-Hellenic architecture was written by the discoveries of Evans at Knossos in Crete, followed by the uncovering of many other sites and monuments of a pre-Hellenic architecture long antedating that even of Mycenæ and Tiryns, and to which the name of Aegean or Minoan has been given. Here were an advanced civilization, monuments of stone, remarkable decorations, a well-developed art of decorative pottery in vases and utensils, all evidencing a culture which was the obvious parent of the later and generally inferior Mycenæan art.

But all these interesting discoveries have so far failed to reveal the primitive sources of the later or true Hellenic culture; that is, of that Greek architecture which came into being after the Dorian migration of 1100 B. C., and of which the outstanding monuments are all of the Doric style. Moreover these Hellenic monuments are nearly all temples, whereas no pre-Hellenic temple was found in either Crete or Mycenæ. This hiatus may some day be closed by the excavation of sites still untouched. Until this happens, the precise origins of the Doric style and of the Hellenic temple-architecture, and the processes by which its various characteristic features were evolved, must remain subjects of speculation. All we really know is that the Dorians who overthrew the earlier Mycenæan culture, as that had overthrown the Minoan, borrowed little if anything from its architecture. They brought with them, from some early home in Europe or Asia, or invented in Greece between 1100 and 600 B. C., certain forms of building which they rapidly developed into a definite system of archi-

tectural design so firmly established by the seventh century B. C. that through nearly six hundred years of architectural activity and constant progress thereafter its fundamental elements remained substantially unchanged. The sturdy stone columns with their channelings and spreading caps, the entablature of architrave, frieze and cornice, with its triglyphs and mutules and its system of

III

The criticism of Greek architecture does not begin with the Greek writers, none of whom has left us any really critical discussion of the building-art of his time. The earliest extant book on architecture is that of Vitruvius, who lived in the time of Augustus (B. C. 26-A. D. 14). Once regarded as the final and almost inspired authority on archi-

ATHENS—THE PINACOTHECA AND PROPYLÆA

mouldings, appear to have reached well-defined types and general acceptance by 600 B. C., and they underwent no substantial change except in refinement of detail, through all the succeeding centuries.

Such, in brief, is the process by which we have reached our present measure of acquaintance with the architectural monuments of ancient Greece; a process which has discredited all the old histories and theories of the origins of that architecture, and still leaves us in the dark as to the genesis and early development of the Doric style in which the noblest and most perfect monuments of Greek building-art were conceived and executed.

tecture, he is now called "a garrulous third-rate writer of the first century A. D.,"* who compiled his "De Architectura Libri Decem" as a digest of the then-existent Greek literature on architecture, all of late date and inferior value. Until the publication in 1762 of Vol. I of Stuart and Revett's epoch-making "Antiquities of Athens" Greek architecture was unknown to the world of art and scholarship. The Roman Revival was then at its height in England, and Roman architecture, thanks to Vitruvius, was supposed to be identical with the Greek. The nonconformity of the

*Sir R. Blomfield in "Greek Art and Architecture" by Percy Gardner and R. Blomfield (Oxford, University Press, 1922).

Parthenon Doric order with what had been supposed to be the normal type—that is, the Roman Doric—shocked the Romanized taste of that day, and it was long before the beautiful plates of the "Antiquities of Athens," previously unexampled for accuracy, made any strong impression on scholars and architects. The purity and beauty of the Greek forms made at first but slow progress in favor with the world of taste of the late eighteenth century. Nearly thirty years after the appearance of the "Antiquities of Athens" we find Sir William Chambers in the third edition of his "Civil Architecture" giving out the following amazing exposition of his own critical genius:

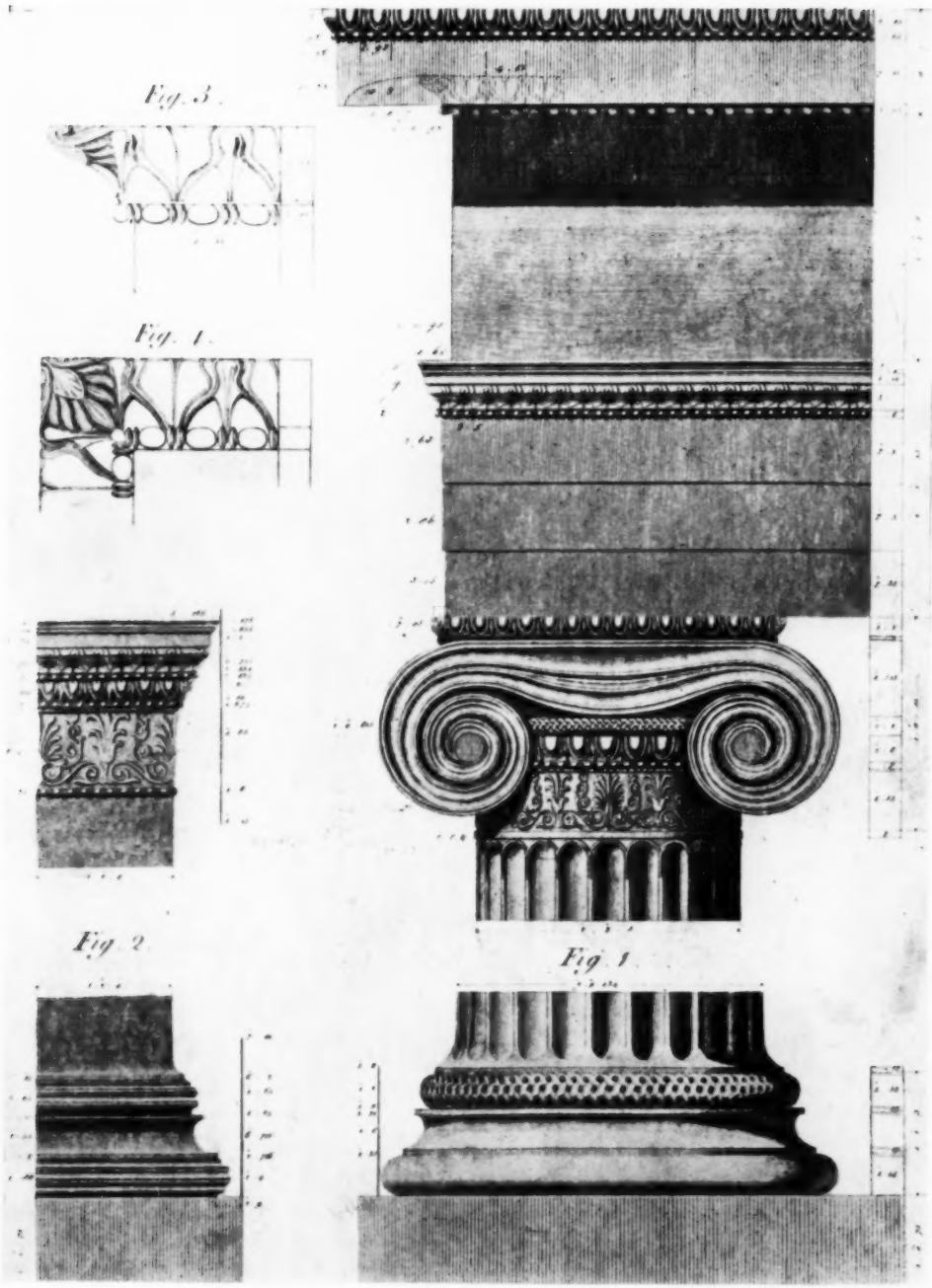
"How distant the Grecians were from perfection in proportion, in the art of profiling and other parts of detail, will soon be evident to any impartial examiner who compares the publication of Leroy, Stuart, Revett and other ingenious Levantine travelers, with the antiquities of the Romans, either on the spot or as they have been given in books by Palladio, Serlio, Desgodrtz, Sandrart, Piranesi and other authors.

"Indeed, none of the few things now existing in Greece, though so pompously described and neatly represented in various publications of our time, seem to deserve great notice either for dimensions, grandeur of style, rich fancy, or elegant taste of design."

But Chambers was the last of the great men of the Roman Revival of the eighteenth century in England. Even when this edition of his "Civil Architecture" appeared, the tide had begun to turn, though but slowly. The pro-Greek influence of the Society of Dilettanti which had sent out Stuart and Revett, and the more powerful influence of the "Antiquities of Athens" itself and of later works like the "Unedited Antiquities of Attica," the "Antiquities of Ionia" and others had begun to turn the attention of architects and writers to the splendor and beauty, the exquisite details and perfect proportions of the Greek monuments. After the liberation of Greece from Turkish oppression (1830) archæological expeditions were multiplied, and the results were published in books of an accuracy of measurement and delineation unknown before the days of Stuart and Revett. In Italy Carcano published one of the earliest works on the genesis of Greek architecture in 1818. Huebsch's "Ueber Griechischen Architektur" appeared in 1822. Quatremère de Quincy in 1829 published his "Monuments et ouvrages d'art antique"; Wilkins his "Prolusiones Arcitectonicae" in 1837, and Gwilt his "Elements of Architectural Criticism" in the same year. The first edition of Pennethorne's "Geometry and Optics of Ancient Architecture" appeared in 1844; Penrose's "Athenian Architecture" seven years later. Most of these works were historical and descriptive rather than critical; they served to make the public acquainted with the plans and external forms and details of Greek architecture, rather than with its philosophy. Criticism and theory came later, after the passing of the Greek Revival had proved the futility of trying to Hellenize modern architecture by dressing all sorts of buildings in all sorts of environments and climates in Greek clothes.

But the Greek Revival of 1825-1850, however futile as a movement for the reform of modern architecture, was of great value in stimulating and maintaining the interest in Greek architecture, which the Gothicists were doing their best to counteract or stifle. How little these last knew or understood of the nature of Greek architecture is exemplified in the various references to it in Ruskin's writings. In his "Seven Lamps of Architecture" all his references to Greek architecture are depreciatory; he has no sympathy with it because he utterly fails to know or understand it. Ruskin was a preacher of the gospel of art, but a poor critic of architecture.

The truly critical study of the Greek monuments may be said to have begun with the first discovery and publication of the architectural refinements of the Parthenon: of the entasis of the columns by Cockerell and Haller in 1810, followed by Allason in 1814; of other curves by Cockerell, first made known by Pennethorne in 1844 together with



FROM *ANTIQUITIES OF ATHENS* BY STUART AND REVETT

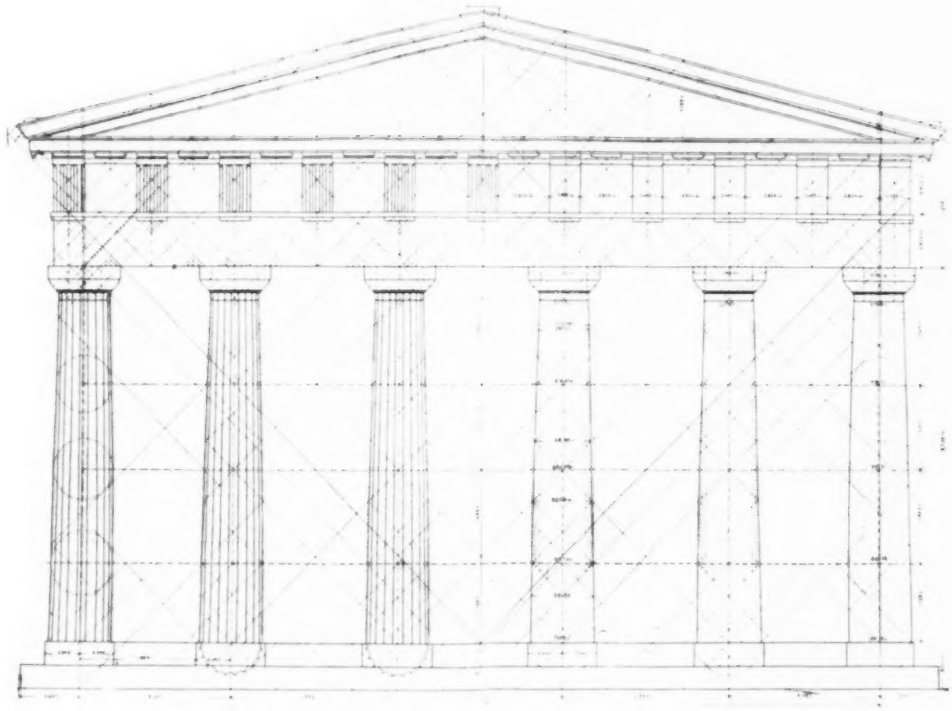
his own researches, in which he announced the profiles of the Parthenon capitals to be hyperbolic curves.* These refinements were later and more minutely and extensively investigated and published by the late F. C. Penrose in his "Athenian Architecture" (London, 1851), and developed in a later edition which appeared in 1888. The latest word to date in this field of investigation is the late Professor W. H. Goodyear's "Greek Refinements," published by the Yale University Press in 1912.

The result of these investigations was to focus attention more than ever upon the details of Greek architecture, in the effort to uncover the secret of their remarkable beauty. Ever since the appearance of Pennethorne's and Penrose's epoch-making investigations there has been an almost steady stream of books treating of these refinements, together with others dealing with systems of proportion by which the extraordinary beauty of the Greek monuments was supposed to have been attained. The earlier works of this kind concentrated attention upon the details of entasis, molding-profiles and the like. The later works have dealt more generally with supposed systems, usually geometric in character, for determining the proportions of the various elements of the design. The number of such works, each of which seeks or professes to have discovered the ultimate secret of the processes of Greek design, is surprising. How many different systems these describe I have not tried to count. The latest and most elaborate of these is the series of publications by the late Jay Hambidge of New York, who sought to explain the perfection of Greek art—not of architecture alone—by various applications of what he terms "whirling squares," in which the diagonals of squares and cubes and the rectangles formed by dividing squares in extreme and mean ratio are conceived to have provided basic proportions for every product of Greek design. This most elaborately-developed theory has found favor in many quarters, and has even been applied to practical design. It has found a warm supporter in Miss Gisela Richter, the learned and accomplished Curator of the Greek Section in the Metropolitan Museum of Art in New York. But it has also met with deep-seated scepticism in other quarters, and has been destructively criticised by Professor Rhys Carpenter of Bryn Mawr and others.

The difficulty with all these systems seems to me to lie in the fundamental assumption of a formula in place of imagination and artistic feeling and perception. The fact that so many different theories have been applied by different discoverers to the same building with equal success must inevitably cast suspicion upon all of them. The further fact that so many of the investigators confine themselves to the end-façade or some other restricted portion of the design, leads one to doubt the validity of theories tested in so limited a way. Moreover on detailed examination, many of the alleged correspondences of the monuments with these theoretical systems are found to be based on incorrect measurements or inaccurate drawings, as Professor Dinsmoor of Columbia has shown by comparing them with his own more recent and extremely accurate measurements of these same monuments, especially of the Parthenon. Furthermore, as one studies each of these systems one finds surprising variations in the applications of the alleged method. Lines are drawn now to the feet of the axes of the columns, now to their outside outlines in elevation; now through the edges of the abaci and again through their centers. With such variations in their applications it is not hard to make almost any system fit almost any façade or plan, particularly if the drawing be not rigidly and minutely accurate. Moreover it should be remembered that curves found to conform closely to the hyperbola or parabola may conceivably have been derived otherwise than by mathematical processes. Thus a contributor to the "American Journal of Archaeology"* considers it possible that many

*Geometry and Optics of Ancient Architecture (London, 1878).

*A. F. Barker in Vol. XXI, pp. 1-24.



THE TEMPLE OF THESEUS IN ATHENS
From *Die Gesetzmässigkeit der Griechischen Baukunst*

of the profile-curves of Greek mouldings were derived from sections of parts of the human body, and would attribute to this the vitality and subtlety of these curves.

In all these various theories, each of which seems so plausible until we encounter another, there appears the underlying belief that the ancient Greeks had somehow discovered some law of proportion or form hidden from all others before or since, a fundamental secret of beauty, mathematical in character, reducible to precise formulae, by means of which they attained unerringly results not otherwise possible. The inevitable conclusion from such theories, pushed to their limit, whether confessed by their authors or not, is the denial of æsthetic imagination, original genius and invention as essential elements in the development of Greek architecture. Such a conclusion is absurd, though inevitable from premises so assumed. As well say that Beethoven composed his Ninth Symphony by means of the mathematical rules of sound-vibration! One trouble with these theorists is the frequent claiming of more or less accidental coincidences as fundamental. As late as 1903 Robert Reinhardt published his "Gesetzmässigkeit der Griechischen Baukunst," in which, upon beautiful but inaccurate drawings of the Theseum at Athens he laid out extraordinary networks of lines at 45 and 90 degrees, some of which could hardly fail to pass through or meet upon significant points. In the same way the late Jay Hambidge, analyzing a more or less inaccurate lithograph of an anthemion-band from the Erechtheum by means of his "whirling squares," found that significant points of the ornament seemed to coincide with significant points of his very complicated system of lines. But by a precisely similar procedure, Professor Walsh of Columbia University proved with equal conclusive-

ness that a globe-valve for steam-pipes in his possession was also designed by means of the "whirling squares"!

The absurdity of thus robbing the Greek architects of all credit for individual genius and imagination need not, however, contradict the conclusion that there were in Greek architecture traditional formulæ, even mathematical or geometrical devices, believed to insure certain qualities of good proportion and harmonious relations of parts. But that these were elastic and ever-changing is clear from the fact that no two temple-plans have the same proportions; that relations of height to diameter of columns were ever varying as well as the profiles of cap-moldings, so that every temple has to be studied as a new and distinct problem, exemplifying the constant modification of the inherited tradition. Only by the interaction of the inherited and traditional formulæ with the architect's individual genius can we explain the vitality, the variety in unity and unity in variety of the Greek monuments. Certain traditional formulæ and processes endured longer than others, some were more elastic than others, so that, in spite of the persistence of the Doric order unchanged in essentials through at least six centuries, every Doric temple is different from all others in many of its details and proportions.

Mr. W. R. Lethaby in the "Journal of the R. I. B. A."* comments somewhat sarcastically on the formulæ of the theorists. He says: "There are so many theories, and they are so contrary to one another! Of course there is contradiction . . . Nothing for instance could once bring Ruskin and Fergusson to agree or even to understand each other." "The architectural features were inherited, and it is not these which concern us, but the underlying theory which dealt with them." "The Greek ideal was intensity, not variation nor originality." Mr. Lethaby refers to the "question of proportion, about which so much vain and high-flown nonsense has been talked."

V

Another question earnestly debated by the critics of Greek architecture relates to the origin of the Doric order. No one knows whence it came, no one yet knows when or where it first appeared. The dates assigned by the archaeologists to its more primitive examples are continually changing. The Heraion at Olympia has been till lately assumed to be the earliest known examples, dating from 1000 B. C.; but recent excavations show that it was the third temple on that site, erected no earlier than 600 B. C. The temple at Corinth, long supposed to date from about 625 B. C., is now assigned to the following century. It is now claimed that the foundations of the first Heraion at Olympia, lately uncovered under the ruins of the Heraion previously known, show that its columns were of wood. While this would prove that the earliest temples had wooden columns, probably with wooden entablatures dressed in terra-cotta revetments, it does not explain when and how the Greeks came to substitute massive stone columns and entablatures for the lighter primitive system. My own theory, worth no more, perhaps than the paper on which I write it, is that there may have been, between the wooden posts of the first Heraion and the massive stone columns of the ruins above it, an intervening system of columns built up of rubble or rough stone, finished in stucco, carrying entablatures at first of wood with terra-cotta dressings, later of cut stone. That no remains of such rubble or rough stone columns have so far been discovered, does not disprove this theory. They would of course disappear when stone columns were substituted. But some such intermediate development between the primitive wooden posts and the later stone order seems to be demanded by the completeness of the order in the earliest known stone examples. I must confess that I have only recently come across an article by F. E. Massey, F. R. I. B. A., proposing for the Doric entablature an origin in an intermediate stage of development, in which the wooden members were revetted with painted terra-cotta, which would explain not only the details of the entablature, but also the system of painting these members which persisted in the later development in marble. Var-

*Volume for 1907-8, pp. 214 sqq.

ious other theories have been proposed to account for the details of the Doric entablature, such as the late Professor Langford Warren's in his "The Foundations of Classic Architecture." None of these theories is, however, quite so fantastic as that put forward by Chipiez in his "Histoire critique des ordres grecs," according to which the triglyphs, guttae and mutules were symbols of the clouds, the rain and the trickling raindrops! Quite as novel and ingenious is the theory of the Doric and Ionic orders set forth by a distinguished American architect, to the effect that the forms of these orders were designed to express the lines of stress and strain acting in the structure, as felt by the builder. The earnestness and ingenuity of Mr. Pond's contention cannot be appreciated except by reading the book itself, written in a straightforward and engaging style.* Imaginative theorizing of this kind is not common to-day; the hard facts of history as written in ruins thoroughly dated, as well as the study of all the extant ancient authorities, compel us to put aside romantic imaginings. That sort of writing belongs to the early part of the last century, before the modern school of historico-critical archæology was born. A delightful instance of the ingenuity of the historical imagination of that earlier day is to be found in Wilkins' "Prolusiones Architectonicæ" published in 1837. Wilkins was a fairly capable architect of the Greek Revival period and the designer of London University. The closing paper of this collection of architectural dissertations is a learned and elaborate argument to prove that the Greek Doric temple was derived from Solomon's temple at Jerusalem, as described in I Kings vi, vii, which Wilkins translates anew from the Septuagint!

Next to the still debated and unsettled question of the origin of the Doric order, the most interesting and important problem to engage the historians and critics of Greek architecture was that of polychromy. The earlier investigators, down to the thirties of the last century, seem to have had no suspicion of the existence of traces of color on either the buildings or the sculptures of ancient Greece. Greek art was almost universally believed to have been exclusively concerned with pure form, and the Greek temples were imagined to have stood silhouetted in pure white against the blue sky and purple hills of Hellas. The first discovery of faint traces of color in the hollows of moldings, in pteroma ceiling-panels and like protected portions of various ruins was tentatively explained as revealing the disfigurements of a degenerate age long subsequent to the original erection of the building. The primary colors used and faint traces of gilding were credited to the inferior taste of the Alexandrian age at the earliest. It was in 1851 that Hittorff of Paris first published his "Le Temple d'Empedocle à Selinonte, ou l'architecture polychrome chez les grecs." This work, although based on the remains of a relatively unimportant temple at Selinus in Sicily, made a sensation, as did also the external mural paintings on the façade of his fine church of St. Vincent de Paul at Paris, built in 1824-44. These paintings unfortunately could not stand the extremes of the Parisian climate, and became in a few years so dilapidated that they had to be finally scraped off. He applied his ideas more successfully to the exterior of the old Cirque d'Été in the Champs Elysées, and his example was promptly followed in Munich in the great murals by Kalbach on the exterior of the Pinacothek. Little by little the critics and students became accustomed to the new conception of the aspect of Doric temples with blue triglyphs and red metope-grounds, with painted moldings and polychromatic sculpture. The discovery of the painted "Ladies of the Acropolis" and of the richly colored "Alexander" sarcophagus at Sidon, now in the Constantinople Museum, completed the discomfiture of the few remaining critics—if any such remained—who had contended for the original whiteness of Greek architecture and sculpture. Since 1880 at the latest, no historian or critic of Greek architecture has failed to mention color as an essential element in the decorative scheme of Greek architecture. Doubtless the

*The Meaning of Architecture, by Irving K. Pond, C.E., A.M. (Hon), Architect. Boston, Marshall Jones, 1918.

splendor of the color-element in Pompeiian architecture, which is quite as Greek as it is Roman, helped to dispel any lingering doubt as to the validity of the Greek tradition of architectural polychromy.

V

When we turn from the critical discussion of origins and of theoretical philosophies of Greek form, color and proportion to the more purely historical and descriptive discussion of Greek architecture we reach safer ground. The very first revelation to the world of the real forms and character of Greek architecture was, as already remarked, the epoch-making work of Stuart and Revett, who were sent out to Athens, then a wretched Turkish town, by the Dilettanti Society of London in 1748. Their "Antiquities of Athens" appeared in 1754, when England was still in the full tide of the Roman Revival. Until the appearance of this work the Greek and Roman architectures had been supposed to be identical, and the revelation of the profound differences between them came as a shock to the world of architectural criticism. The purity and beauty of the Greek forms made at first but slow progress in favor with the world of taste of the late eighteenth century. It was more than twenty years after the appearance of the "Antiquities" that Sir William Chambers in his "Civil Architecture" gave utterance to the amazing exposition of his own critical genius which we have already quoted on page 516. The serious and rational criticism of Greek architecture hardly appeared until the passing of the Greek Revival in England had proved the futility of trying to Hellenize modern architecture by dressing in Greek clothes all sorts of buildings in all sorts of environments and climates.

No review of the criticism of Greek architecture during the first half of the nineteenth century can afford to pass over Ruskin's references to the Greek monuments with such brief allusion as I have already made to them. Ruskin was a mighty power in England in the mid-nineteenth century. The richness of his fervid and poetical style and the intensity of his æsthetic and moral convictions gave his writings a tremendous vogue and great influence. But Ruskin had neither understanding of nor acquaintance with Greek architecture; as we have seen, he selects the Corinthian capital as his Greek exemplar to compare with the Italo-Byzantine capitals of Venice. Now the Corinthian is far from being a typical Greek capital; it was developed late and seldom used until the Romans perfected it in the Augustan age. Ruskin does not admire the Doric capital; of the Doric entablature he says: "The triglyph and cornice are unimitative, or imitative only of artificial cuttings of wood. No one would call these members beautiful." (Ruskin, it must be remembered, based his theory of beauty in architectural detail wholly upon its imitation of actual nature-forms). "The fluting of the columns, which I doubt not was the Greek symbol of the bark of the tree, was imitative in its origin and feebly resembled many caniculated structures. Beauty is instantly felt, but of a low order. Again, the Doric capital was imitative, but all the beauty it has was dependent on the precision of the ovolo (echinus), a natural curve of the most frequent occurence." Ruskin calls the Ionic capital "exceedingly base." In the "Lamp of Power" he does not once refer to the Doric temples of Greece; their majestic strength made no appeal to him. Neither in the "Lamp of Sacrifice" did it occur to him to mention the noble reserve of those temples, of which Sir R. Blomfield remarks that "The Doric seems to me the purest embodiment of the Greek spirit in its faultless form and its austere restraint and rejection of the unessential."*

Twenty or thirty years after the appearance of the "Seven Lamps" and "Stones of Venice" there was published in French a penetrating and sympathetic analysis and critique of Greek architecture from the pen of R. Boutmy, a professor in the Ecole Centrale d'architecture in Paris.† Boutmy's "Philosophie de l'architecture grecque" is referred to in Ernest Gardner's "Ancient Athens" as

*Greek Art and Architecture, by Percy Gardner and R. Blomfield. Oxford Univ. Press. 1922

†Not the National Ecole des Beaux-Arts but an independent school founded by Viollet-le-Duc and still in existence.

" in every way admirable and full of brilliant suggestions." Boutmy analyzes in detail the influences of the topography, climate and environment of European Greece upon the character and taste of the people, and seeks in them the sources of some of the characteristics of the Greek people. He judges that the Greek taste was "subtle rather than fecund, penetrating rather than vast, and above all, intellectual." "In their buildings," he says, "there is a research, a refinement, which has nothing in common with the buildings of the era of decadence, and which indicates an astonishing delicacy of feeling." He derides the optical deceptions and illusions described in Heliodorus of Larissa, but contends that what he (Boutmy) calls the optical *corrections* effected by the curves of stylobate and entablature are justified and worthy of all praise. Perhaps his most important critical conclusion is that in the Parthenon and the finest of the other Doric temples the important feature is not the column but the entablature: "The column is still a subordinate member, the entablature is the dominant part of the building." In other words, the architecture in these temples is a frame for the sculpture, not the sculpture a decoration for the architecture. The entire temple exists for its sculpture, for the great statue of ivory and gold within it and for the pediments, metopes and frieze which it enframes. In the Ionic and Corinthian edifices, on the other hand, "the column is no longer a secondary member; it becomes the chief monumental feature;" the sculpture is secondary or absent."

Boutmy further observes the Greek preference of the relative to the absolute in matters of dimensions. "The profound study which the Greeks made of proportions has no other cause. What one finds in Vitruvius as a cold and rigid theory presupposes a long period of flexible and careful experimentation concerning effects of dimension, mass and relief. 'This temple is too narrow for its length; this column too slender for its height; these solids demand broader voids between them; charm is too far to seek on these plane surfaces'—such are the reflections which I seem to read at every stage in the thought of the architect. The Greeks thought profoundly and earnestly and refined with exquisite feeling those abstract relations which constitute the general grammar of architecture."

I cannot help thinking that this is the correct view which alone explains the progressive refining of both proportions and details in Greek architecture. Formulæ and fixed and precise systems always come late in any art; they mark the hardening of method and the decline of feeling and spontaneity. Vitruvius, who reports rules and formulæ, was an indoor student of Greek writers of the decadence, and apparently had never seen nor studied the monuments of the great age of Greek architecture.

Boutmy's analyses and criticisms are so penetrating and so fair that even now, fifty-four years after their publication, they are worth reading by every student of Greek architecture. Unfortunately the book has never been translated into English.

Among the more recent writers in English on Greek architecture one must mention with entire approval the Gardeners—Ernest and Percy—both of whom have discussed Greek art with equal learning, insight and discriminating sympathy. Percy Gardner's book on Greek Art* discusses the Greek temple in Chapter III, in the course of which, after noting the fitness of the temples to their surroundings, he observes that—

"The Greek temples could only have arisen among a race in which the senses were extremely acute and active, and the mind of a very clear and logical order. It is a triumph of the senses and intellect, in every part inviting close examination and in every part showing definite purpose and design . . . the principles of reason dominating them all."

He notes the difficulty of the subject of proportion and considers that the unit of measurement was the diameter of the column. This seems to me doubtful in view of the constantly varying ratio of this unit to other measurements in various temples, and even in a single monu-

*Percy Gardner, Principles of Greek Art. Macmillan, New York, 1914.

ment like the Parthenon, in which there is a perceptible though not conspicuous variation in the widths and spacings of the columns, triglyphs and metopes.† Ernest Gardner in his "Ancient Athens," manifests a like breadth and sympathy in his appreciation of the Greek genius in architecture and sculpture—which two arts should never be divorced in any critical estimate of either. His chapter on the Parthenon should be read by every young student of Greek architecture. It is devoid of inflated rhetoric, and clearly sets forth the planning, construction and detail of that marvelous work, its history, vicissitudes and adornments, giving due space to conflicting theories and doubtful points. He calls attention to the veneering with what we might call sham masonry, of the bastion and wings of the Propylæa, where it is curious that "the exigencies of the situation or other conditions should have driven the builders repeatedly to use devices which appear at first sight unworthy of the simplicity and honesty usually characteristic of Greek architecture." But here Mr. Gardner is probably in error, as it now appears that this veneering is a *pastiche* of the Roman period. If this is correct it acquits the Greeks of at least a part of Mr. Gardner's criticism on this point. He does not specify the other instances which warrant his use of the word "repeatedly."

Among American writers, leaving out of account special discussions like Professor d'Ooge's "The Acropolis at Athens" and articles in the "American Journal of Archæology," the most noteworthy are, I think, three, now, alas, all passed away. The first to come to my mind is the late Professor Marquand of Princeton, whose "Greek Architecture" is mentioned with commendation by Percy Gardner. This book is, it is true, analytical and descriptive rather than critical, and discusses its subject by topics rather than historically. But Chapter III treats of proportion, from which discussion it is impossible to derive any impression other than that of constant experimentation rather than of any developed system. Marquand recites various ratios supposed to have been employed to determine the main dimensions of front and side, but here again it is impossible to discover any dominant principle or accepted ratio between the main elements of the design. Unlike some other theorists on temple proportions he excludes the pediment from the discussion. And neither he nor any other writer on the subject appears to think that the proportions of the interior of the temple were laid out upon any definite study of dimensional ratios for architectural effect.

The second of the three is the late Russell Sturgis, who wrote with a peculiarly appreciative enthusiasm on Greek architecture, alike in his "European Architecture,"* in the first volume of his "History of Architecture"** and in his "Classical Architecture on the Shores of the Mediterranean."*** The first of these books abound in acute and quite open-minded comments. Thus he notes the small interiors and crowded floor-space of the temples, which limited public worship to the open spaces without: there was no mass-worship of the deity within the temple. A few pages further on he notes how "the carefully considered proportions of the hexastyle temple were at once abandoned when an octastyle temple was decided on. "No attempt seems to have been made to accommodate the design of the fronts or ends of the temple to this addition of one-third to the width." With regard to details he observes that "the designers were always modifying the section of the grooves of the triglyphs and of the channels of the shafts, and of the sweeping bell of the capital. The column in a special way was constantly studied and often changed." "The curves of the echinus and the face of the annulae and gorge were different in them all." He thinks that there is little doubt that the curve of the entasis was made by hand and eye only—a very doubtful conclusion, rejected

†But Professor Dinsmoor, than hom I can quote no higher authority, believes nevertheless "that they employed the lower diameter of the column as a unit of measure." Cf. "Architecture" for 1923, Vol. XLVIII, pp. 241-244.

*European Architecture: Macmillian, New York, 1902.

**A History of Architecture, Vol. I: Baker & Taylor Company, New York.

***Classical Architecture on the Shores of the Mediterranean. Rochester, no date.

by most experts. He also notes that the convexity of the architrave differs at the two ends of the Parthenon.

In discussing the Ionic order, Mr. Sturgis refers to that minute care for small details which is the most marked characteristic of Grecian architecture. He comments on the contentment of the Ionic designers with but four kinds of ornament (which he lists) "as of the Doric with uniform details." He notes the use of fine stucco finish on rough stone as too seldom recognized in the critical discussion of Greek architecture. But he wrote this before Ernest Gardner's notice of this practice in his "Ancient Athens" had come into his hands.

Mr. Sturgis's treatment of the irregular grouping and lack of any apparent system in the Greek temple-groups and his attempt to defend their hap-hazard arrangement as intentional and designed for specific artistic effects, are hardly convincing, and one who reads the Gardner book or who studies the chronology of these groups is forced, I think, to the conclusion that they took shape much as did our earlier college groups in this country, with no preconception of development into an artistic ensemble. The earlier buildings were placed where and how seemed most convenient at the time, the later ones being forced to occupy the best sites left free by the earlier edifices. Even at Epidaurus, where the conditions were favorable for a monumental grouping, it is hard to discover any preconceived arrangement. As a matter of fact, the world had to await the systematizing, organizing Romans, to see groups of monumental buildings arranged on a preconceived symmetrical plan such as, for example, the Forum of Trajan at Rome, or the temple-group at Baalbek. Mr. Sturgis's observation on page three hundred and eighty-five of his "History of Architecture" (vol. I), in reference to the Forum of Trajan, that "all this" (symmetrical grouping of monumental buildings) "might have occurred to a Greek" is a purely gratuitous and unsupported assumption, for as a matter of fact, they never did anything of the kind. The architect of this Forum was, it is true, a Greek, Apollodorus of Damascus, but he worked under Roman orders to conform to Roman ideals. There is no example of such a group built by Greeks in the great age of Greek architecture.

While not all of Mr. Sturgis's judgments have been vindicated by the later developments of archæological investigation, they are almost always suggestive and refreshing in their independence and sincerity.

The late Professor Herbert Langford Warren, of the Harvard School of Architecture, the third of this trio of able American scholars and critics mentioned above, left unfinished a fine work on "The Foundation of Classic Architecture"* which was ably edited and completed by Professor Fiske Kimball, now director of the Pennsylvania Museum at Philadelphia. In this admirable volume the history of ancient architecture is traced from Egypt through Western Asia to Europe, and through Crete and Mycenae and the earlier Doric phases to its culmination in the Parthenon. Just how much of the discussion of the Parthenon is due to Professor Warren and how much to the skillful additions by Professor Fiske Kimball, I do not know, but the discussion is wholly admirable. The final paragraph on the refinements is, I think, the best summary of the motives underlying them that I know of. The author abandons all reference to the "hollow" look of long straight lines, so often referred to by earlier writers, and explains the refinements by three motives: "the preference for the greater sheer beauty of curved lines rather than straight; appreciation of the effect of vitality produced by a freehand character as against mechanical monotony, and desire for the heightened unity resulting when the whole was given a beginning, middle and end, and when no part could be transposed without injuring the coördination of the whole. Thus the building was endowed with the characteristics of a living organism." The briefer account of the Erechtheum is also excellent, up-to-date and discriminating.

Another excellent American contribution to the literature of Greek architec-

*The Foundation of Classic Architecture (Macmillan, New York, 1919).

ture is that part of Fowler and Wheeler's "Greek Archæology"* devoted to architecture. Its brevity is compensated for by its clearness and good sense. A noteworthy addition to this list of critical discussions of Greek architecture must also be mentioned, in Professor Rhys Carpenter's "Esthetic Basis of Greek Art" especially its Chapter IV., which is sound and penetrating. Finally I should mention again the very important work by the late Professor Goodyear on "Greek Refinements" published in 1912, by the Yale University Press, which embodies, along with the results of all previous researches, Professor Goodyear's own measurements and photographs, the results of researches made under the auspices of the Brooklyn Institute of Arts and Science. This is the most complete and authoritative presentation of the facts of purposed deviations from mechanical regularity thus far published in any language, covering Greek monuments in Sicily, Italy and Asia Minor as well as those in Greece proper, and will probably long continue to be, of all works in print, the nearest to the final word on its subject.

The discussion of Greek architecture has now emerged from the stage of recondite and esoteric theorizing and is conducted upon a firm basis of ascertained fact. The net result is to confirm the conviction that the Greeks were endowed with certain sensibilities regarding form such as no other people, before or since, has ever possessed, at least in equal degree, but that they were not miracle-workers. They developed gradually, through long periods of time greatly foreshortened to our consciousness in proportion to their remoteness, certain ideals and methods and conceptions which they brought to the highest perfection in the second half of the fifth century B. C., but which long continued to influence their architecture even in the years of what is called the Decline. They were not miracle-workers, but human beings endowed with a remarkable creative genius and extraordinary artistic sensitiveness. In its own narrow field and for its own purposes their architecture is unsurpassed; it is full of lessons and suggestions for us, and its forms offer not a little that is at least suggestive for us to-day, if used not by copyists but by intelligent reasoners in design. Never again will such ineptitudes and absurdities be perpetrated as the National Monument at Edinburgh or the "Walhalla" near Regensburg.

*A Handbook of Greek Archæology by Harold North Fowler and James Rignall Wheeler. New York, American Book Co., 1909.

St. Ita's Church Chicago

Henry J. Schlacks, Architect
Henry J. Brack, Collaborator

The adoption of the Gothic style for ecclesiastical buildings in America, while frequently challenged, has never been effectually supplanted. There is, to-day, a growing tendency among church designers, to treat the medieval styles more freely, and not to tie themselves too closely to precedent. What they take they modify and adapt to suit modern purposes.

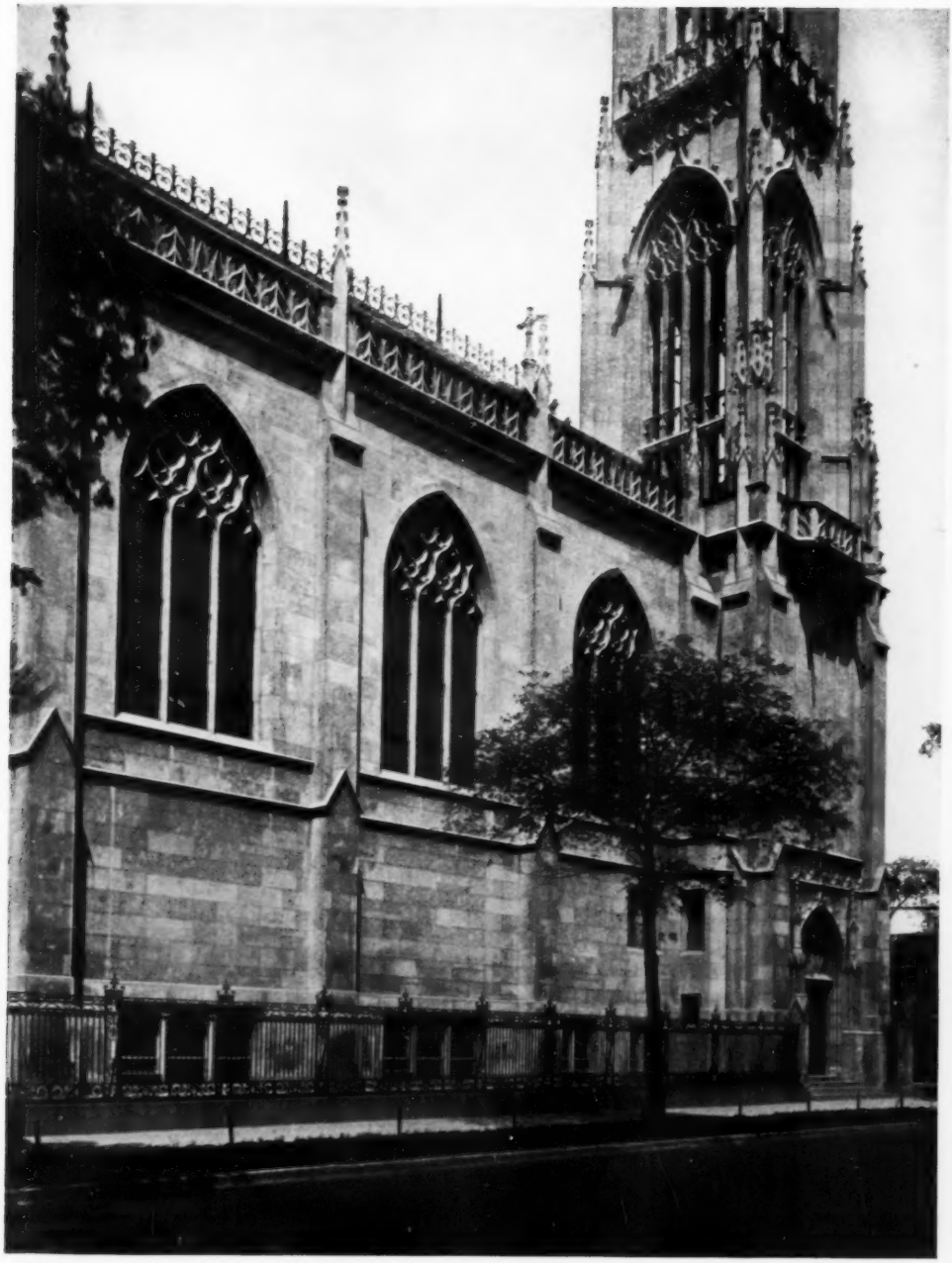
While some Gothicists are disposed to seek inspiration solely in the well-known phases of the thirteenth century French Gothic, or the Norman, or English Perpendicular—others are inclined to range more widely and to seek the rugged or characteristic provincial expressions of the later centuries. Such seems to have been the purpose of the architect of St. Ita's Church, recently completed in Chicago. It is clearly formulated on the late French pattern. It would seem to represent an attempt to utilize the overripened yet lingering vigor of the sixteenth century style. In fact, the inspiring example of the church of St. Brou (1503-1531) set down on the dusty plains of the Bresse, France, furnishes much of the material inspiration for the details. Old St. Brou deserves a word of mention since it is little known and beyond the beaten track of travellers. It was produced at the culmination of the Gothic Cycle at just that time when the Renaissance was beginning to supplant the Medieval system and profoundly to modify its forms and ornamentation. Perhaps the noticeable confusion of ornament and its striking originality must be ascribed to the random association of varied talents. Matthew Arnold enumerates "Flemish carvers, Lombard gilders, German masons, smiths from Spain" as the collaborators who produced the monument.

The evidences of this mixed yet French origin with the late flamboyant characteristics, may be perceived in the decoration of the altar, the fonts and other accessories. Externally it asserts itself in the balustrades, the tracery and panelling of the towers. The blank spaces of the walls complement and give emphasis to the rich and varied details. In fact, this contrast of enrichment with the severe adjoining surfaces is peculiar to the period. There are also dilute evidences of Chartres in the fragile network of the towers. Chartres, to be sure, remains the noblest of all Gothic and as such must continue an inexhaustible quarry to the architect and student; although, as Ralph Adams Cram has pointed out, "almost every other church excels it in some parts."

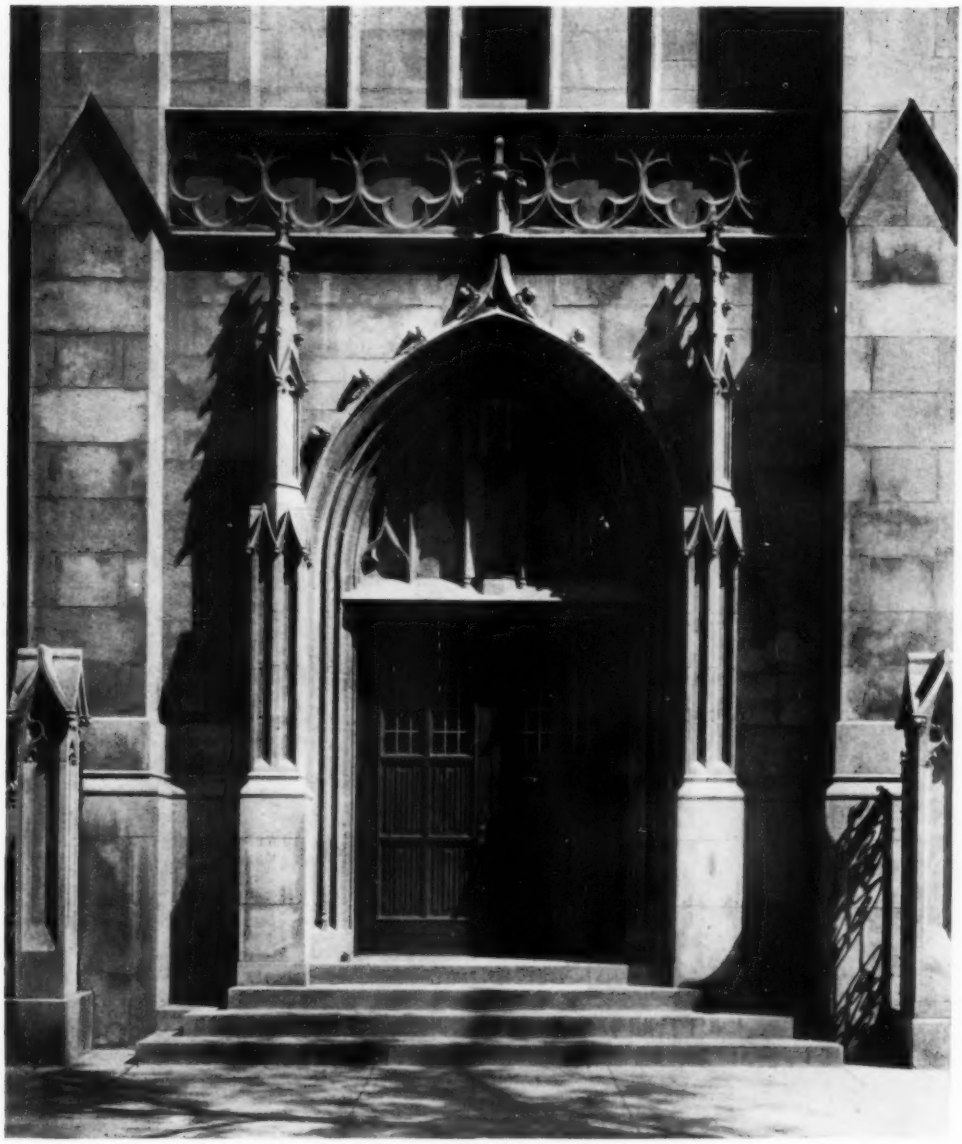
The design of St. Ita's Church is a problem with very definite practical requirements and restrictions. The site is a narrow city lot, 84 feet in width and of limited depth. It was necessary to provide for a seating capacity of one thousand for the upper church, with the unusual condition of supplying an auxiliary church in the basement with the same amount of seating. Moreover the problem was further complicated by the stipulation that the entrances, both at the front and rear, must be arranged so that they would conveniently serve both the upper and lower church together, yet be independent of each other.

The open portico at the front solved the problem of circulation for the main entrance, for from it one may pass up

ST ITA'S CHURCH, BROADWAY AND CATALPA AVENUE, CHICAGO, ILL.
Henry J. Schlacks, Architect; Henry J. Brack, Collaborator



ST. ITA'S CHURCH, CHICAGO, ILL.
Henry J. Schlacks, Architect; Henry J. Brack, Collaborator

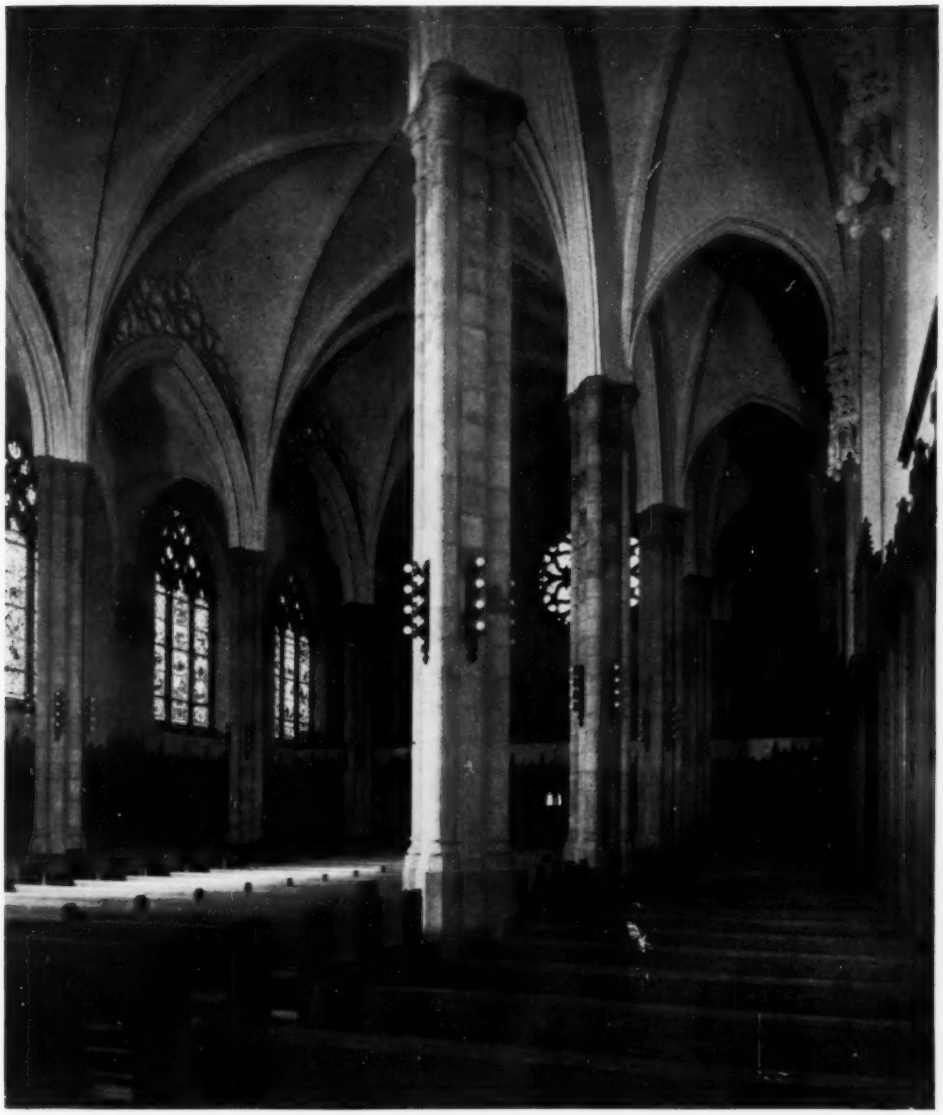


Doorway Entrance to the Lower Church
ST. ITA'S CHURCH, CHICAGO, ILL.
Henry J. Schlacks, Architect; Henry J. Brack, Collaborator

the steps to the upper church, or through doors at the lateral ends of this vestibule one may descend the stairs that lead down to the lower church level. Incidentally, these stairs also serve the independent street doorways that occur at the sides of the towers.

At the rear and on both sides are other vestibules within which are similar stairs to both levels and also entrances to the sacristies.

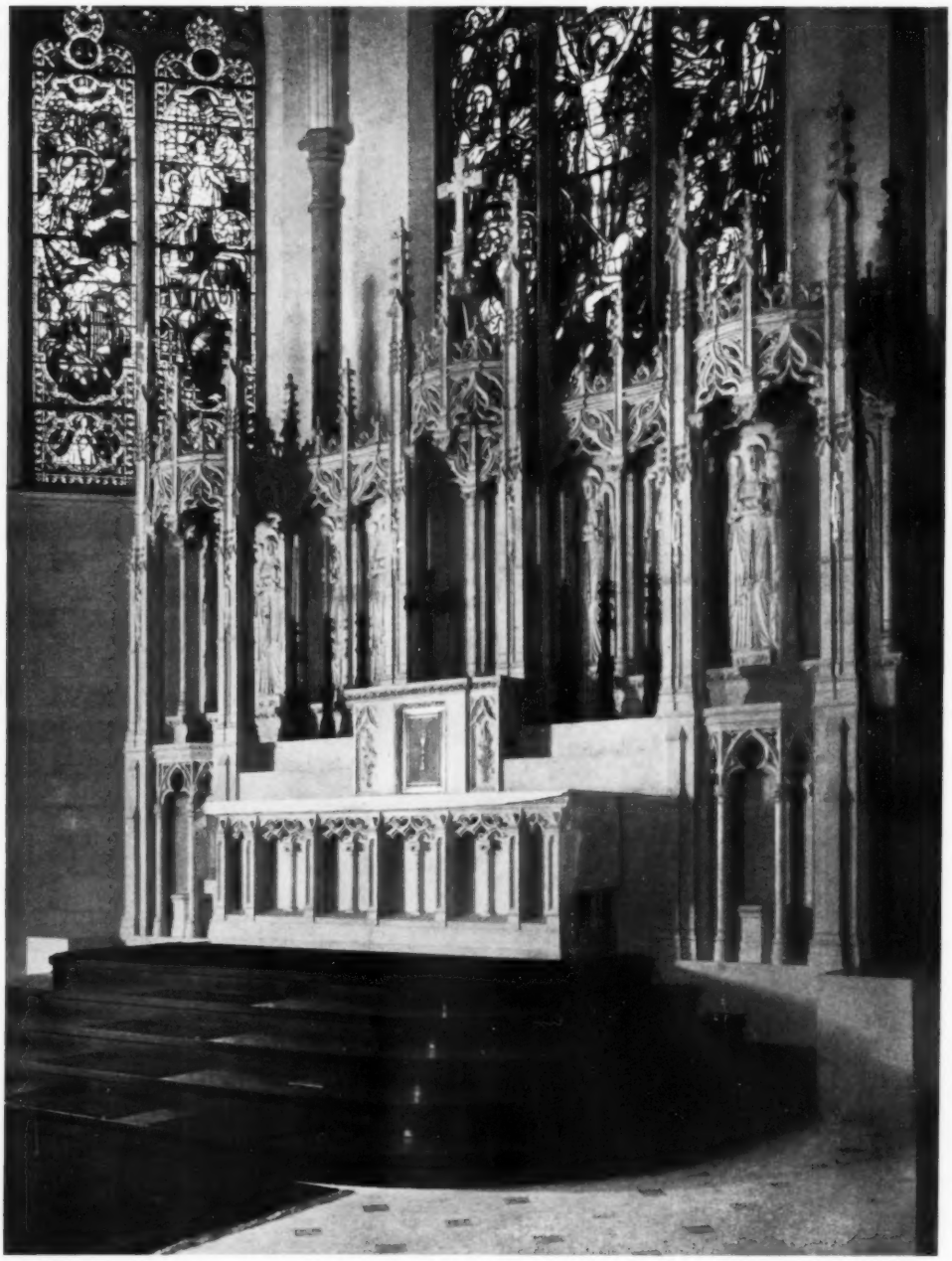
The view of the western front, which appears on page 528 exhibits the scheme of the façade with its triple divi-



General View of the Interior Looking Towards the Rear
ST. ITA'S CHURCH, CHICAGO, ILL.
Henry J. Schlacks, Architect; Henry J. Brack, Collaborator

sion and the dominating and unsymmetrical tower. This tower rises vertically with a minimum of ornamentation to the height of the roof edge, at which place it begins to set back at two stages and to gather an excess of exuberant enrichment. The upper part of the tower is penetrated by two tiers of open traceried windows, which, combined with the silhouette, form perhaps the most impressive feature of the exterior.

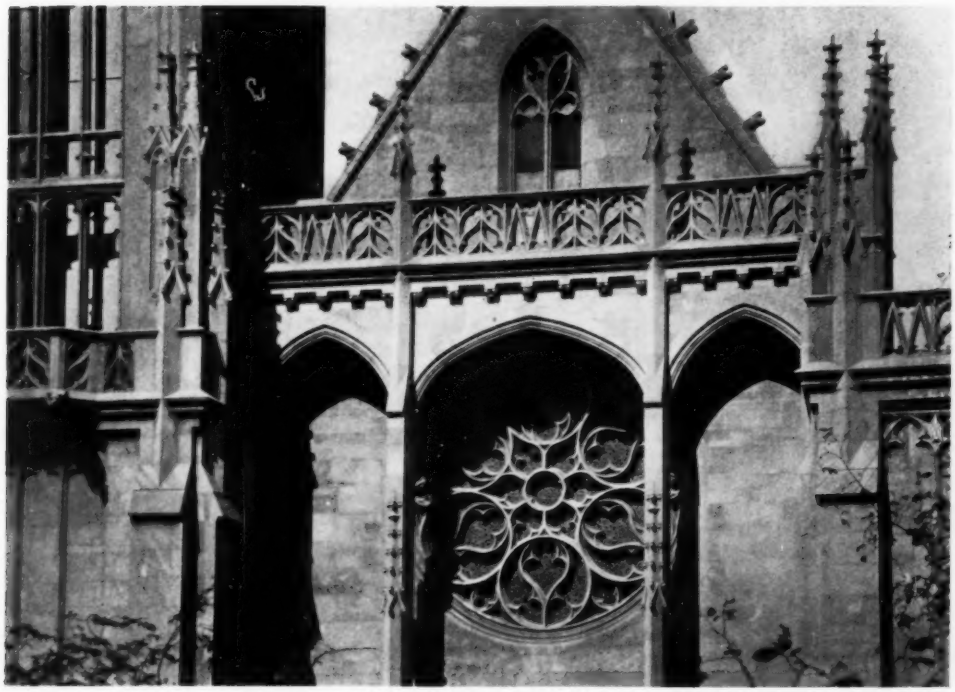
The sharply pointed windows are framed between slender pinnacled buttresses. The need of mouldings around



MAIN ALTAR, ST. ITA'S CHURCH, CHICAGO, ILL.
Henry J. Schlacks, Architect: Henry J. Brack, Collaborator

these window openings asserts itself and, in fact, the general "letting down" of the enrichment is in too marked a contrast with the highly subdivided and multiplied decorative bands and windows of the main façade. The absence of transepts and choir is also noticeable.

Mention has already been made of the



ROSE WINDOW, ST. ITA'S CHURCH, CHICAGO, ILL.
Henry J. Schlacks, Architect; Henry J. Brack Collaborator

vestibule of the west end. By this arrangement of enclosing the steps it was possible to lower the entrance arches to the level of the building and to produce the effect of a porch without the usual projection.

The design of the nave end—always a difficult problem—is given a novel and original treatment by screening the steep gable by a free standing triple arcade. This partly masks the nave wall and overshadows the great rose window at the back.

The most striking feature of the interior is the relatively low height of the nave in relation to the broad and high side aisles. Twelve clustered stone piers are sufficiently slender and wide in spacing to contribute to a spaciousness of effect that assumes the appearance of the hall type of church. This almost uniform openness, while likely to be less aesthetic in perspective effects, is in harmony with the development of the present-day church which seeks to bring the congregation into closer relation with the high altar and the pulpit.

The internal walls are faced, to a height of ten feet, with a carved oak wainscoting, excepting that the sanctuary is lined with Istrian stone. Side altars, of similar stone, center on each of the bays while the high altar forms the climax of interest in the five sided sanctuary.

In reviewing the achievement of St. Ita's, in exterior, interior, as well as the decorative accessories, one is impressed by the considerable success achieved in the direction of unity. Perhaps here again in cosmopolitan Chicago,—as was the case with the older church of St. Brou—we find an instance of the same sort of collaborative effort; German masons, Italian gilders, smiths from Spain and Flemish carvers—all giving a sympathetic response to the leadership of the architect.

SIMPLIFIED PRACTICE

By
S J Tillman

SIMPLIFIED PRACTICE is now strongly recognized by commerce and industry as one of the most significant economic movements of the day. It is now well established as a fundamental of good business management, and during the past year the outstanding development in connection with the simplification movement was the strengthening of support for, and adherence to, the Simplified Practice Recommendations developed by the respective industries.

Naturally the architect, in his daily work on drawing up specifications for new construction work, comes into contact with the simplification practice program. He wants to help to further this movement. How can he do it? The best answer to this is: the architect can materially assist by indicating the simplified lines of any commodity concerning which there is an active simplified practice recommendation.

Interest in the simplification work developed out of the war time birth of the program. Interest was further stimulated by the Survey of Waste in Industry made by the Hoover Committee early in 1921. The establishment of the Division of Simplified Practice in the Department of Commerce, November 21, 1921, provided a clearing house or centralizing agency through which manufacturer, distributor and consumer groups can meet to discuss their common problems and decide upon eliminations which would prove mutually beneficial.

Through the coöperative services afforded to industrial and commercial groups by the Division of Simplified Practice, numerous trade associations have accepted the present list of seventy-five active Simplified Practice Recommendations, and have thereby pledged themselves to adhere to these recommendations as their "standards of practice" in manufacturing, selling or purchasing the commodities covered in the several recommendations. Many individual firms or companies have similarly pledged their support of these recommendations which intimately concern them.

Recognizing that a relatively high degree of adherence makes any simplification program effective, this Division has coöperated with the industries in perfecting a procedure which provides, among other things, for the appointment of representative standing committees to serve as liaisons between the Department of Commerce and the industries concerned. These committees are charged with the duty of promoting, encouraging and supporting the findings of the general conferences, as well as conducting annual re-surveys to ascertain the degree of adherence and to establish re-affirmations or any necessary revisions.

Annual audits or re-surveys, conducted by the Standing Committees in eighteen different fields, revealed that there is an average degree of adherence of 79.5 per cent to their simplified programs. This indicates that the lists of sizes, etc., adopted and published as Simplified Practice Recommendations, are being adhered to.

As a result of the success of Simplified Practice in this country, the movement for elimination of the unnecessary varieties of commodities has become world-wide. Many foreign emissaries have visited the Division to learn at first hand of its workings.

A few of the Simplified Practice Recommendations of interest to the architect and their respective simplification in percentage are:

Metal Lath simplified by 81 per cent
Rough and Smooth Face Brick by 97 per cent
Range Boilers by 90 per cent
Structural Slate by 82 per cent
Builders Hardware by 71 per cent
Asbestos Mill Board by 81 per cent
Steel Reinforcing Bars by 73 per cent
Concrete Building Units by 80 per cent
Sand Lime Brick by 79 per cent
Steel Reinforcing Spirals by 58 per cent
Files and Rasps by 65 per cent
Common Brick by 98 per cent
Hollow Building Tile by 44 per cent
Roofing Slate by 51 per cent
Asbestos Paper by 83 per cent
Hot Water Storage Tanks by 88 per cent
Sheet Steel by 85 per cent
Eaves Trough and Conductor Pipe by 24 per cent
Cut Tacks and Small Cut Nails, sizes, 58 per cent
Cut Tacks and Small Cut Nails, Pkg. Whts 71 per cent

The degree of adherence, as shown by the various annual re-surveys is in itself fair evidence that the objectives sought through Simplified Practice are being reached. These objectives, briefly, in terms of the interests they affect, are: *To the Manufacturer*, (1) More economical manufacture through less idle equipment, better scheduling of work, accurate cost accounting, long runs on large units, simplified packing, simplified material inventory and reduced cost per unit; (2) More efficient labor through less seasonal employment fluctuations, increased individual output, greater skill of workmen, ease of training employees, simpler and better inspection, smaller labor turnover and greater earning power; (3) Less capital tied up in raw materials, special mechanical equipment, semi-finished stock, storage space and repair parts.

To the Consumer, it means better value for money, better quality, prompt deliveries, quick replacement service, lower maintenance costs, simplified specifications, protection against unscrupulous traders.

In all of this work the Division is concerned solely with finding and supporting the best thought and practice of the interested industry. In no way does it make pretense of technical knowledge. In no way does it attempt to determine or even suggest simplifications which the industry should adopt. Its sole function is to bring together all interests and to support such action as these interests may mutually agree are to the genuine advantage of all groups and to the Nation at large.

The following Simplified Practice Recommendations should be in the library of every Architect, to ensure his familiarity with the specific Simplified Practice Recommendations:

No.
3. Metal Lath
4. Asphalt Penetrations
7. Rough and Smooth Face Brick—Common Brick
8. Range Boilers
12. Hollow Building Tile
13. Structural Slates for Plumbing and Sanitary Purposes
14. Roofing Slates
15. Blackboard Slates
16. Lumber
18. Builders' Hardware
19. Asbestos Paper
21. Brass Lavatory and Sink Traps
25. Hot Water Storage Tanks
26. Steel Reinforcing Bars
28. Sheet Steel
29. Eaves Trough and Conductor Pipes
30. Terne Plate
32. Concrete Building Units
35. Steel Lockers
38. Sand Lime Brick
49. Sidewalk Lights
52. Staple Vitreous China Plumbing Fixtures
53. Steel Reinforcing Spirals
57. Wrought Iron and Wrought Steel Pipe, Valves and Pipe Fittings
61. White Glazed Tiles and Unglazed Ceramic Mosaic
71. Grading of New Billet Steel for Concrete Reinforcement
72. Solid Section Steel Sash

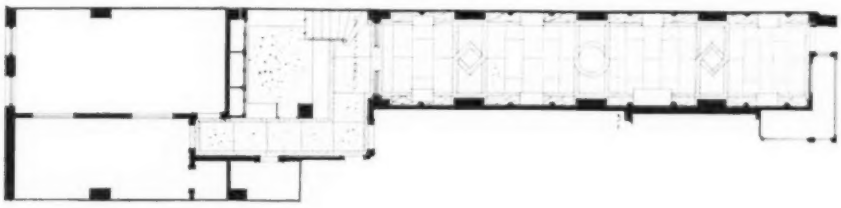
These Simplified Practice Recommendations with the exception of Nos. 16 and 18 may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. for 5 cents a copy; No. 16 is 15 cents, and No. 18 is 10 cents.

Show Room and Offices of The Remington Typewriter Company, New York

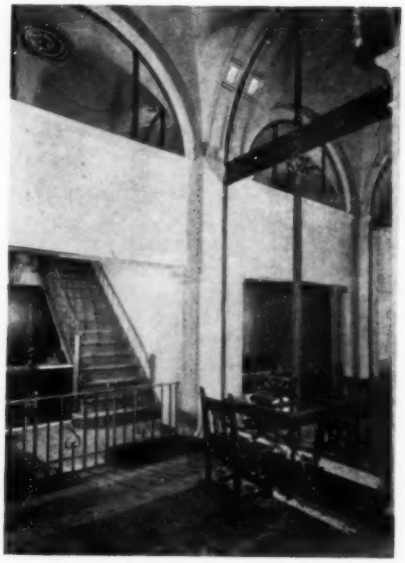
Goodwillie and Moran, Architects

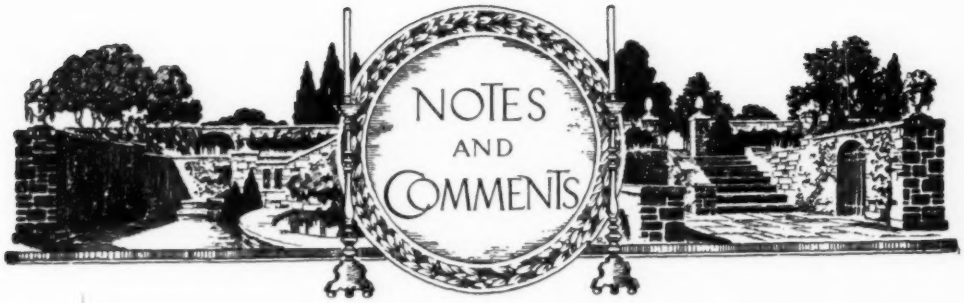
A condition of extreme narrowness existed in the floor space of the Remington Company's showroom and offices in New York City after the necessary requirements of elevators, hall and stairs had been met.

By using large mirror surfaces, the architects succeeded in gaining an apparent increase in floor width. Wall surfaces were divided by artificial stone piers between which were placed mirror surfaces separated by moulding and half round colonnettes terminating in eagle finials. The showroom has a black marble base and border and a floor of terrazzo in black and buff laid out in panels.



Floor Plan, Showrooms and offices





Goodhue's Architecture: A Critical Estimate

It is now three years since Bertram Goodhue lay under his violet-strewn pall before the altar at St. Thomas's. That is a short time to give historical perspective, yet already we can look at his work with clearer sight, at least, than on that day. The noble memorial volume to the "Architect and Master of Many Arts," from the press of the professional body he adorned, was written by men who loved him, their eyes still moist in personal remembrance of the sincere artist and fascinating man. They were in no mood to judge his ultimate place in the story of the arts. To try to forecast this is a bold and ungrateful task for anyone, yet this is what the critic is asked to attempt.

The estimate of the future will be found, of course, in the answers to two distinct questions, aesthetic and historical: Was his work intrinsically beautiful? Was he in the vanguard of the artistic evolution of his time?

From all we know of the history of taste and artistic judgment we may be sure that the answer to the first will be subject to revision in every century and every generation, with the swing of thought and of contemporary art. It is absurd to speak of certain works and men on whom all the centuries have agreed. There are none. The style of the Parthenon itself was condemned by the third century B. C.; and, after a period of honor in Roman times, it was regarded, until the middle of the eighteenth century, as a quaint archaic monument. In our own day we have seen one such great revolution in the criteria of judgment. From a scientific and moral equation of beauty with truth—"truth" to nature, to convenience, to materials, to construction; "expression" of bathrooms, of skeletons, of the difference between a tobacconist's and a pantatorium—we have come again to believe in the possibility of an abstract and intrinsic beauty of plastic form—of solids, spaces, surfaces, and lines, infused with life by the ardor of the artist.

It is a revolution of this sort, occurring from generation to generation, which makes us hate the work of our fathers and grandfathers. That must be a very great work which can survive one such, to say nothing of the revolutions of the future; it must be a work rich in various qualities, which different generations can discover according to their several bents. In trying to forecast the survival of Goodhue's work we must judge by more than one of the possible criteria.

In his beginnings Goodhue himself represented an art and a philosophy which preceded the worship of logic and function—a romanticism which exalted fantasy, exuberance, "picturesqueness." All these his early work has in notable degree. Perhaps his most characteristic creations were the dream cities which rose so magically under his pen: Traumburg and Monteventoso and Xanadu, cities of domes and towers, rising on lofty rocks, or cliffs washed by the sea. It was typical of an eclectic age that these, like their names, were always suggestive of certain periods of the past, chosen, to be sure, for their romantic appeal; the Gothic of the North with its chivalry and mysticism, feudal Italy, the mysterious East. Some of these picturesque dream cities he built at West Point, at San Diego, and many more of their individual houses and churches, like Saint Stephen's, Cohasset, on its ledges. Even on the prosaic street corner of the crowded town he achieved something of romance in St. Thomas's. Mr. Charles Platt, we hear, turns with a shudder from St. Vincent Ferrer, under his windows. We who are more onlookers than combatants, however, can feel that here Goodhue was at his best. In designs like these the romanticist still felt free to be himself.

As he grew older he began to be dissatis-

fied with his romanticism. Even within the Gothic, old Mr. Charles Herbert Moore convinced him, "the essence of the French cathedral plan is logic." He grew dissatisfied with his mediaevalism. Daily experience convinced him that "Mediaeval Gothic is now impossible, and the Gothic we do today, if it is to be vital, and beautiful, and true, and good . . . must be of our own times." At first he didn't mean "that we must abandon . . . any of the old materials," and said, "Steel framing and reinforced concrete are good enough things in their way . . . but just because we have such materials is no reason why we should throw away stone and oak." But by 1918, at least he had come to a different emphasis, holding in a letter to Paul Cret, "that while architecture should represent a decent reverence for the historic past of the art," and "we should only ignore our rightful heritage for the most compelling reasons, one of these compelling reasons is the modern invention of the steel frame, or reinforced concrete construction: that this form of construction does abrogate practically all known forms." "I assure you," he added, "I dream of something much bigger and finer and more suited to our present-day civilization than any Gothic church could possibly be." Thus, though realizing himself "too conservative wholly to abandon the language of ornament to which I am accustomed," he was moving, when he died at fifty-seven, toward the camp of the logicians and modernists.

THE NEBRASKA STATE CAPITOL, LINCOLN, NEB.
From *Bertram Grosvenor Goodhue, Architect and Master of Many Arts*

Paradoxically, yet naturally enough, as Goodhue moved toward "modernism," he moved also toward classicism—the classicism of calm and ordered masses and spaces. The force of late-Victorian rationalistic theory overbore romanticism in his thought; the force of the classic spirit in the great body of contemporary American work overbore romanticism in his practice. From the early days, although Greek form repelled him as a *fait accompli*, he occasionally worked in it admirably, under duress, and at the end it forced his hand. One of his closest associates has told me that until late in his life Goodhue shunned Italy, fearing he would succumb to the spell of the classic. When he commenced to do government buildings he had to make concessions, and he approached the task with a heavy heart. At least he would criticise the *fait accompli*, he would rationalize the classic. Unconsciously he would Gothicise it as well.

Among his executed works of the last period the most significant are the Nebraska Capitol and the National Academy of Sciences. About the capitol local patriotism has engendered a gale of tumid eloquence so that it is not easy to view the building for itself. It is a composition of gaunt and simple masses, the broad base, marked by continuous hozizontal lines, contrasting sharply with the lofty tower of multiplied and unbroken verticals. The logic for which the designer strove is mostly apologetics. In the general disposition, the practical functions of the tower are an afterthought. In spite of Goodhue's eagerness that his buttresses should really "butt" and his columns "col," they only seem to do so. Mass and line are the essentials of the building, and its impressive merits are in these, not in structural truth. Details of "style," however, largely occupied the designer. It is, as Goodhue said, " a sort of Classic" although the elimination of many horizontal cornices from the competitive design have made it also a sort of Gothic or Byzantine. Especially in the interior, where Assyrian and Moorish reminiscences, with not a few French and Italian conventions, likewise appear, the effect is sometimes that of a collection of tags, not vitally unified in form.

The building of the National Academy of Sciences and the National Research Council has similar qualities of detail without the Nebraska Capitol's major assets of variety of mass and of grand dimension. Inevitably

lacking these, it might best, one would think, have sought impressiveness by a uniformity of motive within the simple rectangle of the front—a uniformity which could have been achieved with no more violence to the interior than has actually been done to it in the complex and unrhythmical spacing that we now see. Form has been sacrificed with no gain in "truth."

Once he had accepted steel, Goodhue dreamed of a skyscraper which, by office rental, would bear the cross far above even the monuments of insurance and of the chain-store. Essentially his tower for the site of the old Garden was the tower of the Nebraska Capitol on a still vaster scale. It was a scheme of soaring lines, and of vast corner buttresses, which didn't butt, of course, and tended to destroy the rental on which the whole was predicated. It was a glorious vision of form, based on a contradiction in terms. Naturally it wasn't built, but the vision has remained. It gleams often in Hugh Ferriss's paper cities of the future, and is palely reflected in more than one executed building.

In the final judgment of Goodhue, we have agreed, there must be taken into account, beside the intrinsic quality of his works, the question of leadership. We must recognize that in the great movements on the stage of the world he made but a dilatory entrance, and his steps were halting and uncertain. Essentially he was a belated romanticist and eclectic. The Gothic revival abroad had pretty well run its course of a century and a half, before his advent. Pugin, whom he admired, and whom he resembled in facility, preceded him by two generations. Even in America Gothic work quite as powerful or fine as his had been done a half century earlier by John Haviland, Upjohn and Renwick. Supremely impressionable, he veered, in his middle years, with every wind that blew, from Spain, from Byzantium, from Persia.

His turn to the logic of function, his attempt to express modern material, came a generation after that of Sullivan, Wright and Otto Wagner, themselves not so much pioneers as consummators of a half century of speculation and experiment. In inner consistency their work was far beyond his, which must be regarded as representing not a transition but a tardy compromise. Was the compromise of historic style with "logic" not even, perhaps, a compromise on a dead issue? Must the form be an "organic" outgrowth of function and structure, or was the biological analogy a fruitful suggestion for one generation of creative artists, not a law for all?

The merit of the Nebraska Capitol, as of Goodhue's houses and gardens at Montecito, is one of clarity, not of "truth," and comes of his compromise with the classic. Such a compromise is nothing new—it is the "free classic" of the Englishmen salving their consciences toward Ruskin and Lethaby, Ruskin's follower and Goodhue's friend. There is indeed much of the Edwardian Englishman in the latest Goodhue—from Pugin and Sedding, he has passed through the younger Scott to Bentley and even Sir John Burnett. Goodhue, who wrote in 1909 that English classic was feeble and generally *un*classic, did not wholly escape the same pitfalls. Long before him, in the front of the Boston Library, McKim had shown how the classic may be reconciled with reason, if it must. But McKim was wiser than he, in knowing, though he did not say, that beauty is another thing than truth, and that we do not need new words to write a new poem, for the poem will give new meaning to the old words.

FISKE KIMBALL.

The Architect as Beneficiary of the Better Packing Movement

For architects, an obvious blessing of the present organized movement for the improvement in methods of packing commodities is found in the conservation of those building materials and supplies which have to be transported long distances between the point of primary production and ultimate consumption. Secretary Hoover has estimated that the annual waste through careless and improper packing aggregates some millions of dollars.

The study of scientific packing, fathered by the government at Washington, has come gradually to its present full stride. The project in its present form may be said to date from 1921 when the Committee on Merchant Marine of the U. S. House of Representatives held hearings on the subject of pilferage in international trade, an evil that was alarmingly prevalent at that time. As a result of the disclosures, the Congressional body asked the U. S. Department of Commerce to undertake a thorough investigation of packing practice and possibilities. This research, which is a continuing project, is concerned with the packing of both domestic and foreign shipments.

Approaching the project without preconceived prejudices, the aim has been to consider and appraise impartially every form of

container and every species of wrapping and protective material. The coöperation of the foremost specialists in packing in the fields of commerce and industry has been enlisted. Exceptional advantages have been enjoyed in facilities for experiments with new packing mediums and for tests under conditions approximating every stress and strain of actual service. For the latter, the Forest Products Laboratory at Madison, Wis., has devised special testing apparatus. The explorative work has centered at the National Bureau of Standards where notable additions have been made to the paraphernalia of packing, as witness, for example, the invention of a case-lining paper that is possessed of waterproof qualities.

One of the phases of this contemporary specialization that may prove particularly meaningful to architects is the study of packing for parcel post and express shipment. The package service presents new possibilities to all who have need for emergency shipments in record time by reason of the "Special Handling Service" which secures the transportation of parcels with all the expedition of first-class mail and may be supplemented by Special Delivery at destination.

The effect desired of the "educational campaign" with respect to parcel post and express shipments, which was launched in 1926, is discouragement of the present practice of relying upon paper wrapping alone for many classes of articles and encouragement of strapping for the reinforcement of merchandise containers. After extensive study the specialists declare that metal bindings are usually a material aid in securing the most servicable container at a minimum cost. One of the conclusions derived is that the thickness of the sides, tops and bottoms of well-balanced nailed wooden boxes possessing adequate strength and serviceability without metal bindings may be reduced 20 to 40 per cent. when metal bindings are properly used. Metal bindings,—either flat metal straps or wires (used in single strand or twisted together) have the added advantage that being difficult to open and reclose without special tools, they afford an effective preventive of concealed pilfering.

The experience of the War Department during the World War has given the Department of Commerce a cue which, when duly followed up, bids fair to reveal unsuspected possibilities in the bale as a vehicle of merchandise packing. The War Department has estimated a saving of 82 per cent. in the use of bales as compared with the heavier wooden containers. It has been brought out, too, that for certain commodities the insurance rates for pilferage and damage are lower when packed in bales than when shipped in wooden containers.

Crate specifications can never, perhaps, be standardized to the same degree as boxes because a crate must be built to fit each individual commodity. This has not deterred the packing evangelists from an effort to improve crate construction. As one means to this end a study has been made of the various species of wood available for packing-box construction, with special reference to the strength values and other qualifications for crate service. For articles that require more protection than is afforded by a frame alone, the Federal packing engineers incline strongly, provided the conditions are favorable, to what is known as the panel box. This form of construction combines the merits of the crate, with its three-way nailed corners and with the nails driven into the side grain of the boards, plus the factors required in a box.

In order to give utmost application to whatever of technical knowledge is acquired, the Transportation Division of the U. S. Bureau of Foreign and Domestic Commerce has made a beginning in giving specific advice on packing methods for commodity groups. Thus there have been taken up in detail the particular packing requirements of machinery, electrical equipment, including electric lighting fixtures, sanitary supplies, hardware, portland cement, etc. Other classes of commodities will be taken up in order. The impression must not be left that this ambitious project concerns itself only with external packing. Coincident with the research along the lines above indicated there has been prosecuted with encouraging results, a study of internal packing with the object of further protecting the articles that have adequate outer shelter and sparing them from the effects of severe climatic conditions, moisture, mold, etc. As an integral part of this research there is the quest for ideal specifications for partitions and separators which serve to prevent individual articles from jolting or striking one another.

WALDON FAWCETT.

Correction

In an article on the residence of Mr. and Mrs. Willard M. Clapp, published in the October, 1927, issue of the Architectural Record, an error was made in describing the exterior of the house as "of seam face granite from Quincy, Massachusetts." This should have read "of seam face granite from Plymouth Quarries, *East Weymouth*, Massachusetts."

A History of Architecture in Italy*

This is a new edition of a work published in 1901, but long out of print. The reissue is welcome, for there is still no better book for a student of the subject to take with him to Italy. It is not only condensed and portable, but somehow it is also copious, readable and scholarly. The four hundred and sixty-two illustrations are clear in detail, and always on the page where they belong, each beside the text it illustrates.

The earliest Christian churches in Italy—if they may be so called—of which anything survives, are little underground chapels or cubicula in the catacombs. In the six years between Constantine's conversion (324) and the transference of the government to Byzantium, he built six great basilicas, which have all been ruined and rebuilt, but one of them at least (St. Agnes) substantially in the same manner.

Illustration from *A History of Architecture from the Time of Constantine to the Dawn of the Renaissance*

It should be borne in mind that the great basilicas, not less than the modest chapels, were simply sanctuaries inclosing the graves of martyrs. The burial of the dead being forbidden within the city, these sanctuaries had to be outside the walls. The relation of the church to the grave of the saint, and the fact that the basilica (or law court) plan was adopted in its main features by Constantine, has much to do with subsequent church architecture. Moreover, up to the sixth century the buildings of Italy were in the main the production of the Roman race of buildings, essentially in the Roman manner.

The architecture which developed there in the next six centuries is commonly called Romanesque. It is not very homogeneous. Mr. Cummings divides it into Northern or Lombard Romanesque, the origin of which is various and disputed. Central Romanesque, between Tuscany and Rome, which was more classic and conservative; and Southern Romanesque, where Roman rulers and Greek sculptors had influence. Romanesque has something Asiatic and Byzantine in it, and a great deal that is Roman, and yet is none of them, but the product of a different period and people. The term is a subject of heated controversy. What actually goes on in the minds of builders and appears in their products is far too complex and obscure to be accurately described by any terms or definition of terms. In general one may say

*A History of Architecture in Italy from the time of Constantine to the Dawn of the Renaissance. By Charles Amos Cummings. 2 vols. Houghton Mifflin Co., 1927. $12.50.

that the Roman tradition has always dominated Italian architecture. Romanesque and Renaissance are both more Roman than anything else. But the attempt to reduce any great period of art to a set of principles always falsifies it and Romanesque is more miscellaneous than Greek, or even Gothic. It is a term to cover a period of building in Italy. The Lombard Romanesque builders developed a high degree of technical skill. It seems very probable, therefore, that it was the demand for their skill which carried the characteristics of their work into districts of southern Germany.

Illustration from *A History of Architecture in Italy from the Time of Constantine to the Dawn of the Renaissance*

Mr. Cummings believes the Byzantine influence more lasting and general than any other external influence on Italian architecture. The traveller in Italy associates it mostly with mosaics at Ravenna and in St. Mark's. But the eastern Byzantine dome is structurally very different from the Russian dome. The latter was a hemisphere supported by piers, usually four, with crossing arches. Still, it is in the mozaics and the love of color that the Byzantine influence is most readily apparent, and as a matter of classification it might well be put with the other factors in the complex of Romanesque.

Gothic in some sense and degree was developed, out of imported Romanesque, by an era of creative builders in northern France, into one of three or four great and unique architectural styles. It came back into Italy in the thirteenth and fourteenth centuries. Italian society was emerging from the chaotic conditions preceding, and this northern style was superior to Romanesque in logic, in daring, in its decisive character. But it never was really at home in Italy. The Roman tradition was against it. The Renaissance came earliest to Italy, and Gothic palpably Italianized is a very different thing from the Gothic of Amiens and York.

Eight of Mr. Cummings' nine chapters are on religious architecture—church and monastic. In the destruction of violent ages, it was the churches that were spared. There is very little civic building that remains from back of the twelfth century. The city halls and palaces of nobles were, except in Venice, massive, grim, built for defense. During the thousand years and more which he covers "sculpture and painting were but the handmaids of architecture, and architecture was the servant of the church."

A short review can give no idea of the wealth of the subject or of Mr. Cummings' success in the presentation. There is perhaps no country which has so much history written in architecture as Italy, or written there more legibly, or has had such wild vicissitudes of history to record. To mention a minor instance of Italian supremacy, there is no country that can rival her in the architecture of fountains. Nowhere are there so many old towns with histories and personalities of their own. Rome is three capitals, ancient, ecclesiastical and modern, and the fact is written large in its architecture. Florence is overrun with tourists and noisy with street cars, but there are quiet old towns in Tuscany, and the Tuscan campanili are the most exquisite of towers. Mr. Cummings stops at the fifteenth century, but to limit the field is the first step to genuine cultivation and as one's interest in Italian art grows, its tendency is to travel back, rather than forward, from the fifteenth century.

ARTHUR W. COLTON.

NEW BOOKS ON ARCHITECTURE AND THE ALLIED ARTS

The Architecture of Ancient Greece. Part I of The Architecture of Greece and Rome. By: William J. Anderson, A.R.I.B.A., R. Phene Spiers, F.S.A., F.R.I.B.A. Revised and rewritten by William Bell Dinsmoor. New York: Charles Scribner's Sons. 1927 2nd ed. x. 241 pp. Ill. 6⅛ x 9¼ in. Cloth, $7.50. (The Historical Architecture Library.)

The Architecture of Ancient Rome. Part II of The Architecture of Greece and Rome. By: William J. Anderson, A.R.I.B.A., R. Phene Spiers, F.S.A., F.R.I.B.A. Revised and rewritten by Thomas Ashby, D.Litt., F.S.A. New York: Charles Scribner's Sons. 1927. 2nd ed. xiii. 202 pp. Ill. 6⅛ x 9¼ in. Cloth. $7.50. (The Historical Architecture Library.)

The first and second sections of Messrs. Anderson & Spiers' "Architecture of Greece and Rome" has now been re-issued in separate volumes, thoroughly revised and enlarged to about double the original size. The books will be found thoroughly up to date and representative of the modern outlook. At the same time they have been entirely re-illustrated, and a remarkable series of pictures has been assembled from the latest photographs, and the most accurate and up-to-date drawings, reconstructions, plans, &c., by the foremost scholars.

The Smaller House of Today. By: Gordon Allen, F.R.I.B.A. New York: Charles Scribner's Sons. 1927. 1st ed. xiii. 179 pp. Ill. (pt. col.) Diagrs. 5⅝ x 9 in. Cloth. $3.75.

In this book the author, who is the winner of the recent Daily Mail prize for the best £1500 house, reviews for the first time the most recent type of Smaller English House and gives a practical demonstration of how such houses may be built to the maximum of good design, good construction, and sound comfort at the minimum of expenditure.

RECENT TRADE PUBLICATIONS

issued by manufacturers of construction materials and equipment

[*These may be secured by architects on request direct from the firms that issue them, free of charge unless otherwise noted.*]

Heating, Oil Burners. A.I.A. File No. 30 gI. The Electrol all-electric, entirely automatic oil burner. Advantages of the master control. Full description of burner and advantages of oil heating. Basement plans—burning oil and burning coal. Principal parts of burner. Tanks: types and specifications. Domestic hot water service. Suggested detailed oil burner specification. Cost of operation. Testimonials and typical installations. Electrol, Inc., of Missouri. 170 Dorcas St., St. Louis, Mo. 8¾ x 11⅝ in. 32 pp. Ill.

Heating. The Venturafin method of unit heating as applied by the Austin Co. in the mammoth new Oakland-Pontiac plant. Advantages of Venturafin and reasons why it was selected for the largest factory heating problem in 1926. Details and specifications. Dimensions. Piping details. Construction of heating surface and fan. Installation and application. American Blower Co., 2539 Woodward Ave., Detroit, Mich. 8½ x 11 in. 16 pp. Ill.

Streator Cold Storage Doors. Catalog "A." Bulletin No. 1-19. Front and open views of standard door, standard cooler door, standard track door, flush panel door, flush panel track door, standard ice chute, bunker door, service front. Full particulars of materials used. Construction details. List giving sizes and weights of cooler and freezer doors carried in stock. Streator Cold Storage Door Co., 903 East La Rue St., Streator, Ill. 8¾ x 11½ in. 24 pp. Ill.

Faucets, China. "Faucets in Colorful China." Characteristics and durability of faucets. Colors: black, yellow, green, blue, lavender and white to harmonize with color scheme of bothroom. Construction information. The Dececo Co., 76 Batterymarch St., Boston, Mass. 8½ x 11 in. 4 pp. folder. Ill.

Gas Machines. Gas-O-Matic—dependable gas supply, generating fuel on the premises safely and cheaply. Advantages and simplicity of operation. Uses in kitchen, living room, bathroom and laundry. Testimonial letters. Tolectro Corporation, 500 Fassett Street, Toledo, Ohio. 4½ x 9½ in. Ill. Folder.

Thermostatic Traps. A. I. A. File No. 30c23. Bulletin 1200. The new Webster Series 78 Thermostatic Traps for "Process Steam." Methods used, full particulars of construction and performance. Special features, dimensions, ratings. Advantages and installations. Warren Webster & Co., Camden, N. J. 8 x 10½ in. 12 pp. Ill.

Cork Covering. A. I. A. File No. 37-b-6. Folder containing Bulletin 270, "Corkanstele Homes." Steel framework into which waterproofed corkboard is fitted. Rubber-cork plastic insulation for all types of cold fittings. Full particulars and directions for application. Novoid Corkboard Insulation. Full particulars of manufacture and use; advantages. Novoid Cork covering for refrigerated lines and tanks and drinking water systems. Service details and specifications. Bulletin 274. Novoid Corktile Floors. Advantages; specifications and installation details. Bulletin 275. The Insulation of Refrigerated Drinking Water Lines. Tables

of insulating value of Novoid cork pipe covering. Two methods of insulating all cold fittings. Bulletin 276. Corkanstele Refrigerated Buildings. Cork Import Corporation, 345-349 West 40th St., New York City. 8½ x 11 in. Ill.

Kitchen Sinks. The Eddy Sink, for homes and apartments. Advantages: for washing dishes; for preparing foods. Full information and particulars of various models. Roughing-in measurements, dimensions and weights. The D. A. Ebinger Sanitary Mfg. Co., 201 Lucas St., Columbus, Ohio. 6 x 9 in. 12 pp. Ill.

Closet Lining. Supercedar. A. I. A. File No. 35n2. Full description and particulars of sizes and measurements. Information regarding grade, manufacture, cost and package. Retention of oil content. Suggestions for installation. Plans for a typical supercedar storage room in the attic or basement of the home. Specifications for an attic storage closet. George C. Brown & Co., Memphis, Tenn. 8½ x 11 in. pp. Ill.

Hoists. A. I. A. 30i1. G&G Telescopic hoists for ash removal and handling material between floors. Electric and hand power models with full information and particulars regarding their watertight sidewalk doors with automatic opening, closing-locking device and safety spring guard gates. Specifications for each model hoist. Detailed drawings. Gillis & Geoghegan, Inc., 537 West Broadway, New York City. 8½ x 11 in. 24 pp. Ill.

Glass. Reproductions of advertisements describing aurora glass for doors, partitions, etc. Factrolite wire glass for factories. Syenite polished glass for all types of construction. Pentecor wire glass for skylights. Apex glass for partitions. Full description of glass and particulars of manufacture including sizes and thicknesses. Mississippi Wire Glass Co., 220 Fifth Ave., New York City. 8½ x 11 in. 16 pp. Ill.

Flush Valves. Catalog No. 28, 1927. Full information regarding the three types of valves, including the new foot control. Method of operation and installation particulars. Typical roughing-in suggestions; directions on installation of flush valves in old houses where the piping sizes are insufficient to properly operate flush valves without the use of pressure tanks. Pipe sizes. Prices. The Bridgeport Brass Co., Bridgeport, Conn. 5¼ x 7½ in. 46 pp. Ill.

Waterproofing, in connection with concrete exposed to the weather. A. I. A. File No. 7-B-21. Methods to obtain impervious concrete. Minwax transparent waterproofing and brick and cement coating. Specifications: preparation of surface, application, preparation of old surfaces. Typical installations. Minwax Co., Inc., 270 Madison Ave., New York City. 9 x 11⅞ in. 4 pp. Ill.

Glass. Lighting. Celestialite. A. I. A. File No. 31f23, folder for architects' files. Complete engineering data. A few typical shapes of globes and advantages of this special glass. Gleason-Tiebout Glass Co., 200 Fifth Ave., New York City. 9⅞ x 13 in. 4 pp. Ill.

Boilers. A. I. A. File No. 30c1. Bulletin No. H-7. Steel heating boilers. Design: fire radiation: larger number of smaller tubes single-flue-pass: steaming circulation: Proved advantages of Fitzgibbons design. Construction. Detailed drawings; tables. Fitzgibbons Boiler Co., Inc., 570 7th Ave., New York City. 8½ x 11 in. 20 pp. Ill.

Roofing, Zinc. Standing seam horse head zinc roofing. Description of product with information as to durability, advantages, usages and method of packing. Cost. Testimonials and typical installations. Details and instructions for laying roofing. The New Jersey Zinc Sales Co., Inc., 160 Front St., New York City. 8½ x 11 in. 4 pp. folder. Ill.

Portland Cement for Mortar. A. I. A. File No. 3-L. Non-staining Portland Cement Mortar. Recommended specifications for setting, pointing and backing Indiana limestone and similar stone subject to staining. Typical installations. White and colored mortar for brick or terra cotta. Recommended specifications for white or colored mortar for brick or terra cotta and for setting tile. The Atlas Portland Cement Co., 25 Broadway, New York City. 8½ x 11 in. 20 pp. Ill.

Steel Trusses. A. I. A. File No. 13G. Bulletin No. 201. The Ingalls Truss. Detailed loading tables with explanation. Detailed dimensions and sections with drawings. The Ingalls Steel Products Co., Birmingham, Ala. 8½ x 11 in. 12 pp. Ill.

Swimming Pools. Condensed specifications for concrete swimming pool construction. Full particulars regarding design and construction of concrete swimming pools. Sanitation information. Wading pools. Detailed drawings. Portland Cement Assn., 33 West Grand Ave., Chicago, Ill. 8½ x 11 in. 20 pp. Ill.

Face Brick. F. F. Vees or controlled distorts. Information regarding color, texture and characteristics of brick. Delivery information. Old Virginia Brick Co., Salem, Va. 8½ x 11 in. 4 pp. Ill.

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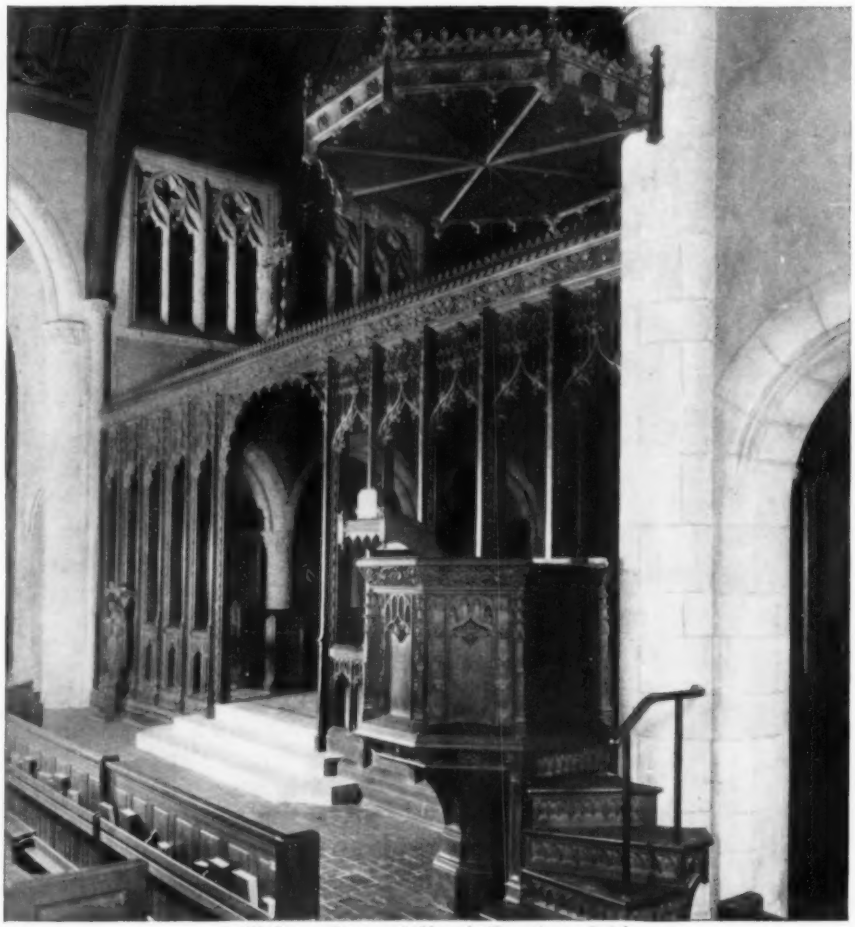

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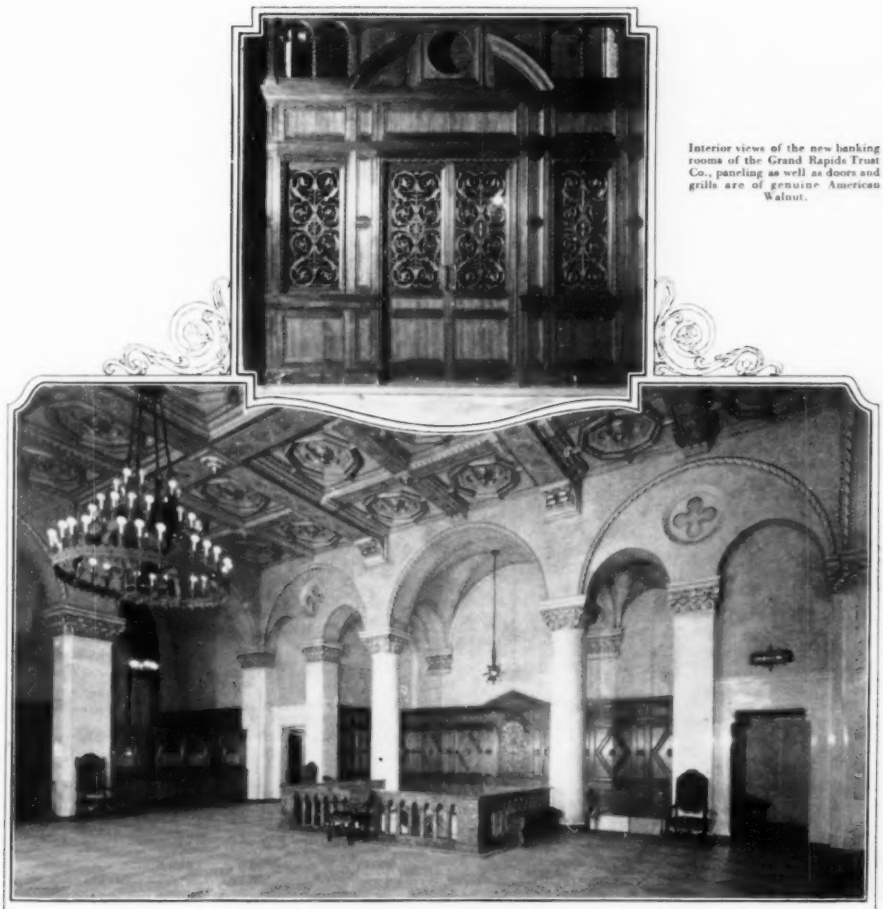

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Narrow growth rings (A) produce close grain (B) resulting in fine grained flooring (Fig. 1)—Ritter Oak Flooring.

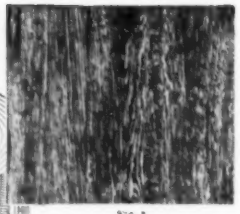
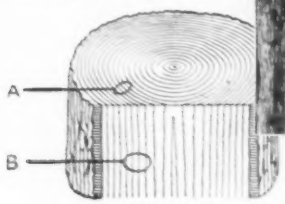


Fig. 1



Wide growth rings (C) produce coarse grain (D) resulting in flashy grained less beautiful oak flooring (Fig. 2).

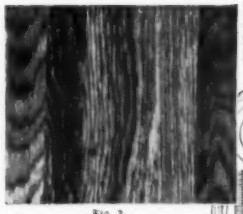
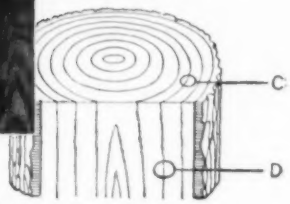
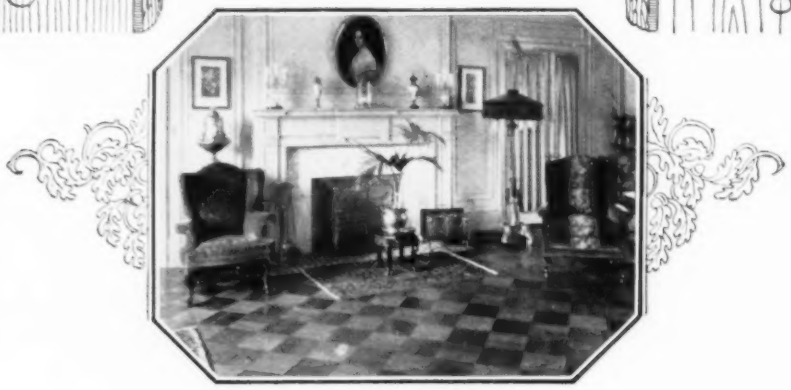


Fig. 2





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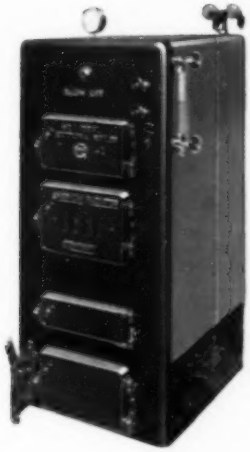

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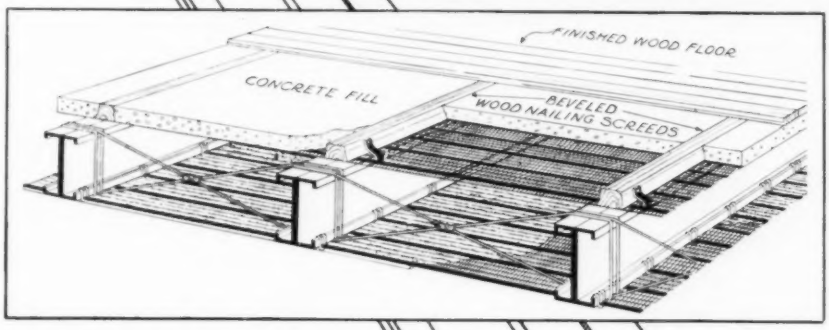

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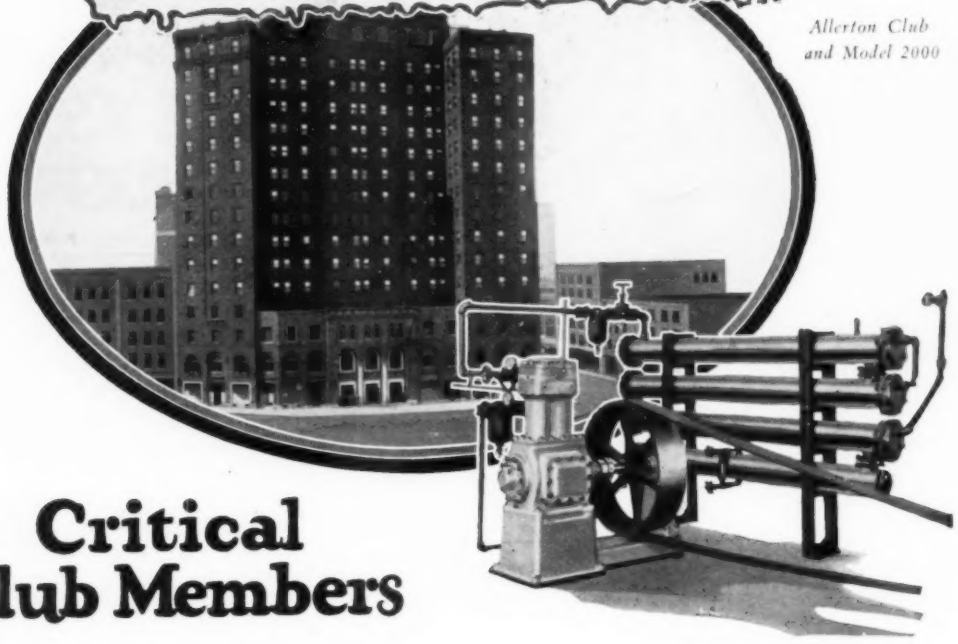

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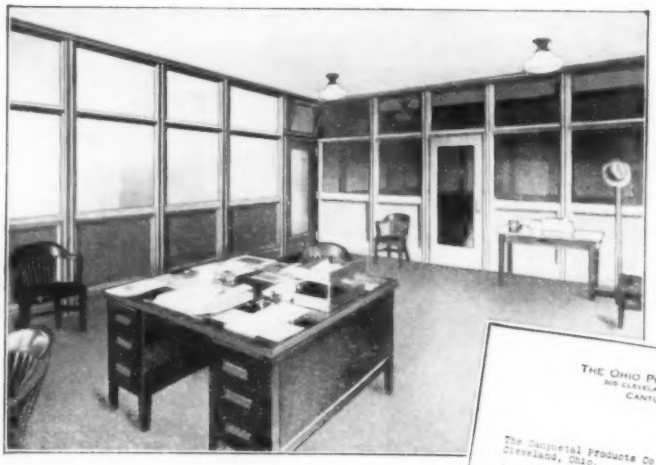

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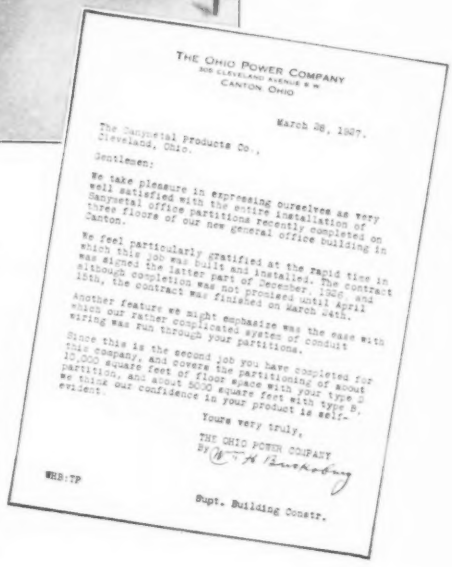

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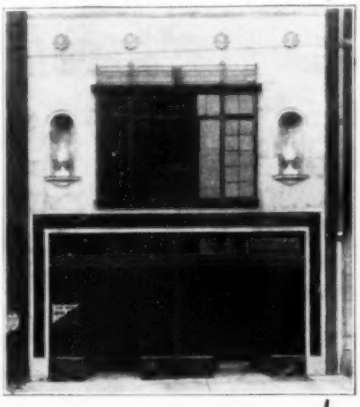
E. G. Blanke, Baltimore architect, who believes that even a commonplace structure can have some distinction and charm in its exterior.



Stout's Store, Baltimore, Md., which illustrates Mr. Blanke's ideas as to exteriors and roofing. This building has a facade of marble and is covered with Carey Built-up Roofing.

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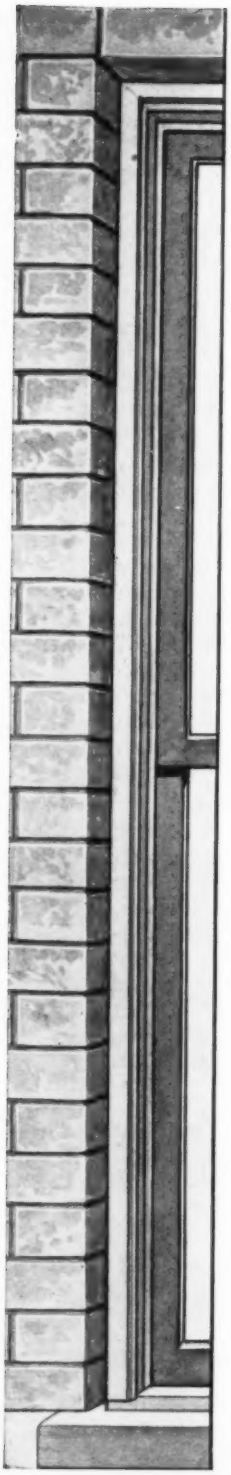

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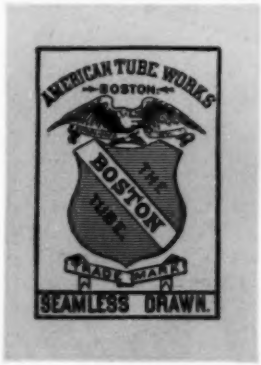

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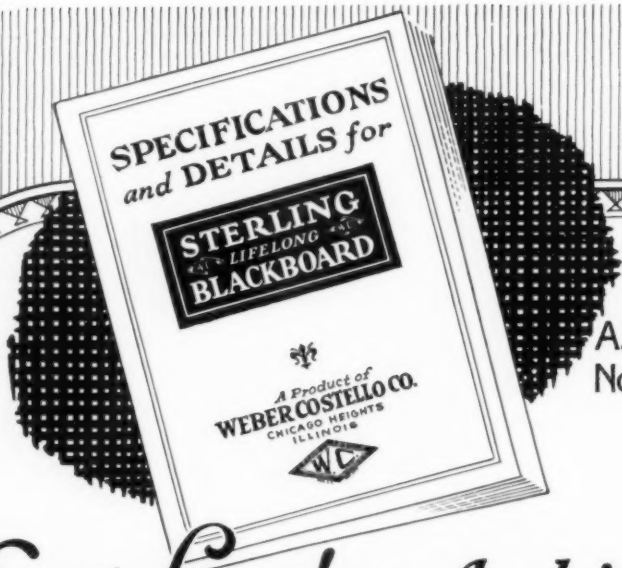

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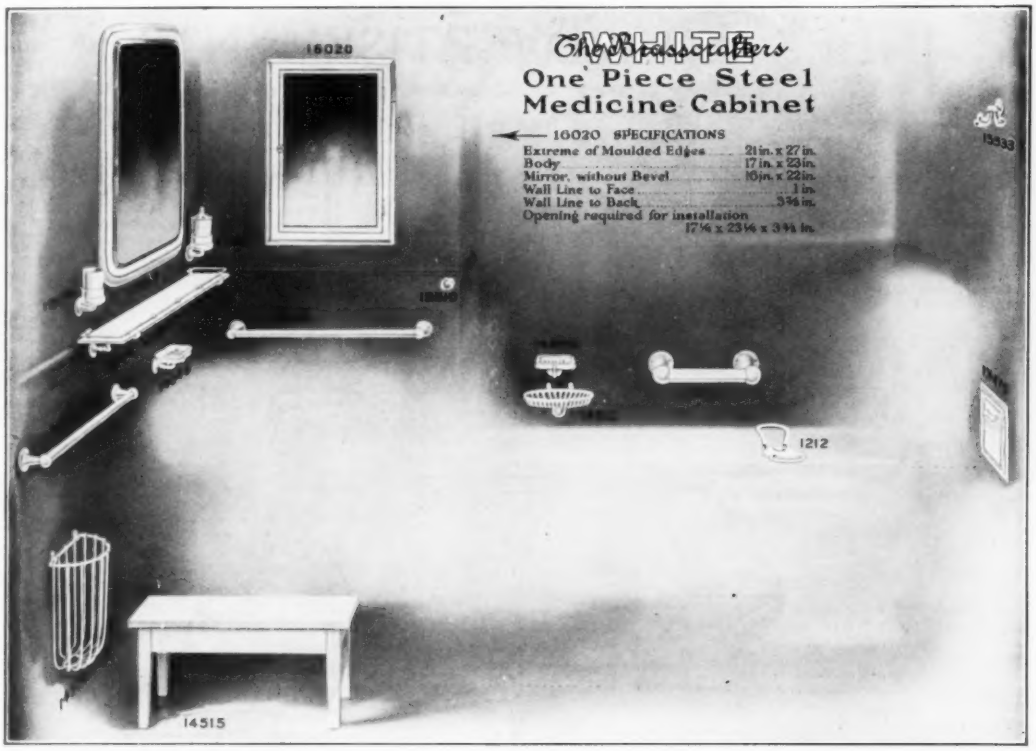

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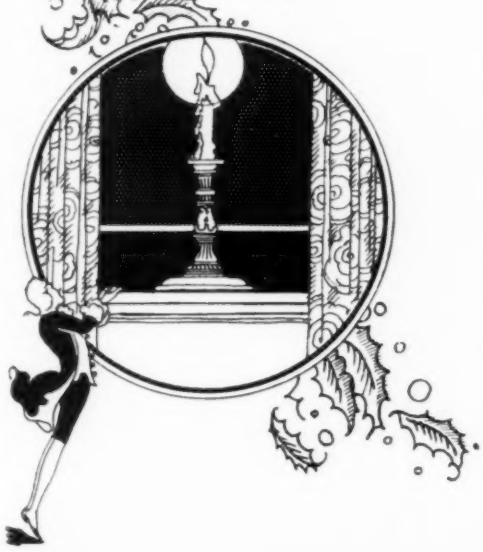

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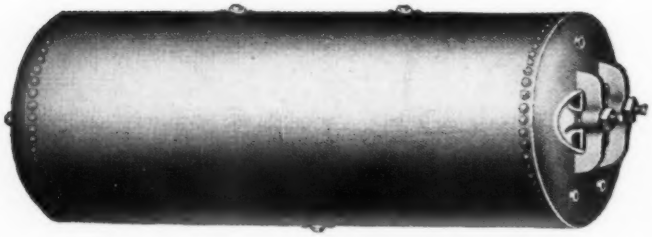

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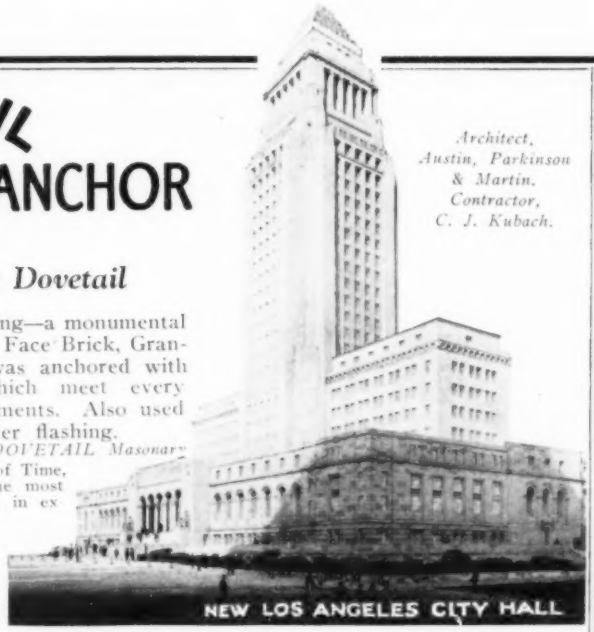

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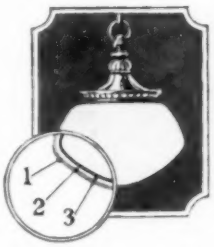

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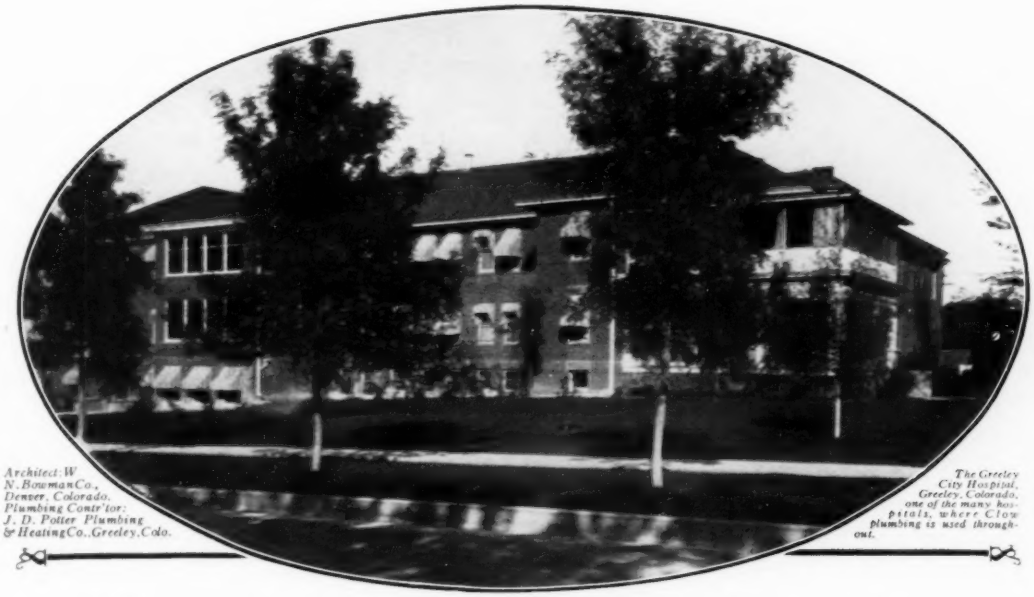

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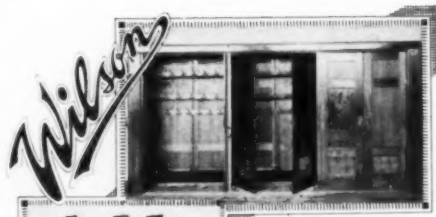

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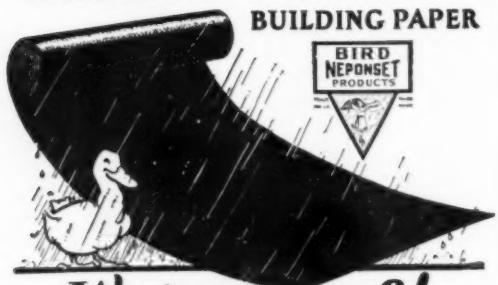

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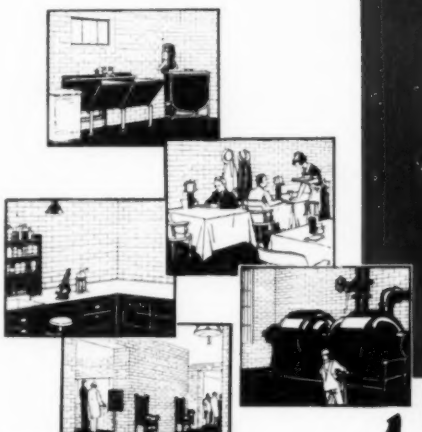

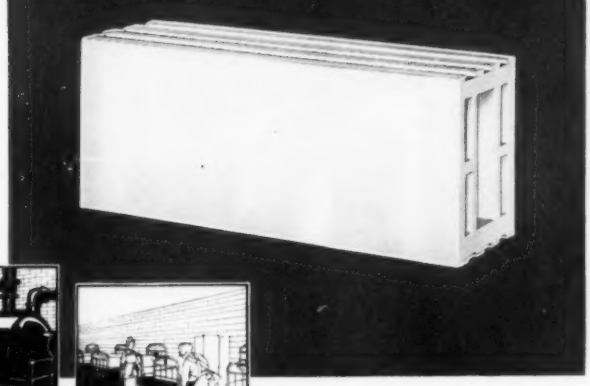

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WILLIAM F. HEMSTREET, architect, announces the removal of his office to 27-29 Beaver Street, New York City.

MICHAEL F. DE ANGELIS, architect, formerly of Exchange Place Building, announces the opening of new offices at 49 East Avenue, Suite 307, Rochester, N. Y.

S. GRANT ALEXANDER, A.I.A., F.R.I. B.A., F.F.S., President of the Grant Alexander Architectural Organization, announces the removal of his office from the Chamber of Commerce Building, North Market St., to 113 East College St., Asheville, N.C. The postal address remains P.O. Box 1234, Asheville, N. C.

KARL A. HAUSER, architect, announces the opening of an office for the general practice of architecture at Kenwood Ave., Catonsville Knolls, Catonsville, Md.

C. V. R. BOGERT, architect, announces the opening of offices in the Peoples Trust and Guaranty Company Building, 210 Main Street, Hackensack, N. J.

VICTOR H. RIGAMOUNT, architect, announces the opening of an office at 1540 Broadway, New York City.

THE nephews of Mr. F. F. Farris, architect, deceased, will continue the firm of F. F. Farris under the same name with offices at 1117 Chapline Street, Wheeling, W. Va.

ANNOUNCEMENT is made of the death of Mr. Robert Peterson of the architectural firm of Peterson & Clark. The firm will continue under the same name with offices in the Steubenville Bank Bldg., Steubenville, Ohio.

GEORGE G. RIPA announces the opening of an office for the practice of architecture at 108 South Jefferson Street, Orange, N. J. Manufacturers' catalogues and samples are requested.

H. H. MUNGER and C. C. Britsch announce their partnership under the firm name of Britsch & Munger, architects, with offices at 220 Colton Building, Toledo, Ohio.

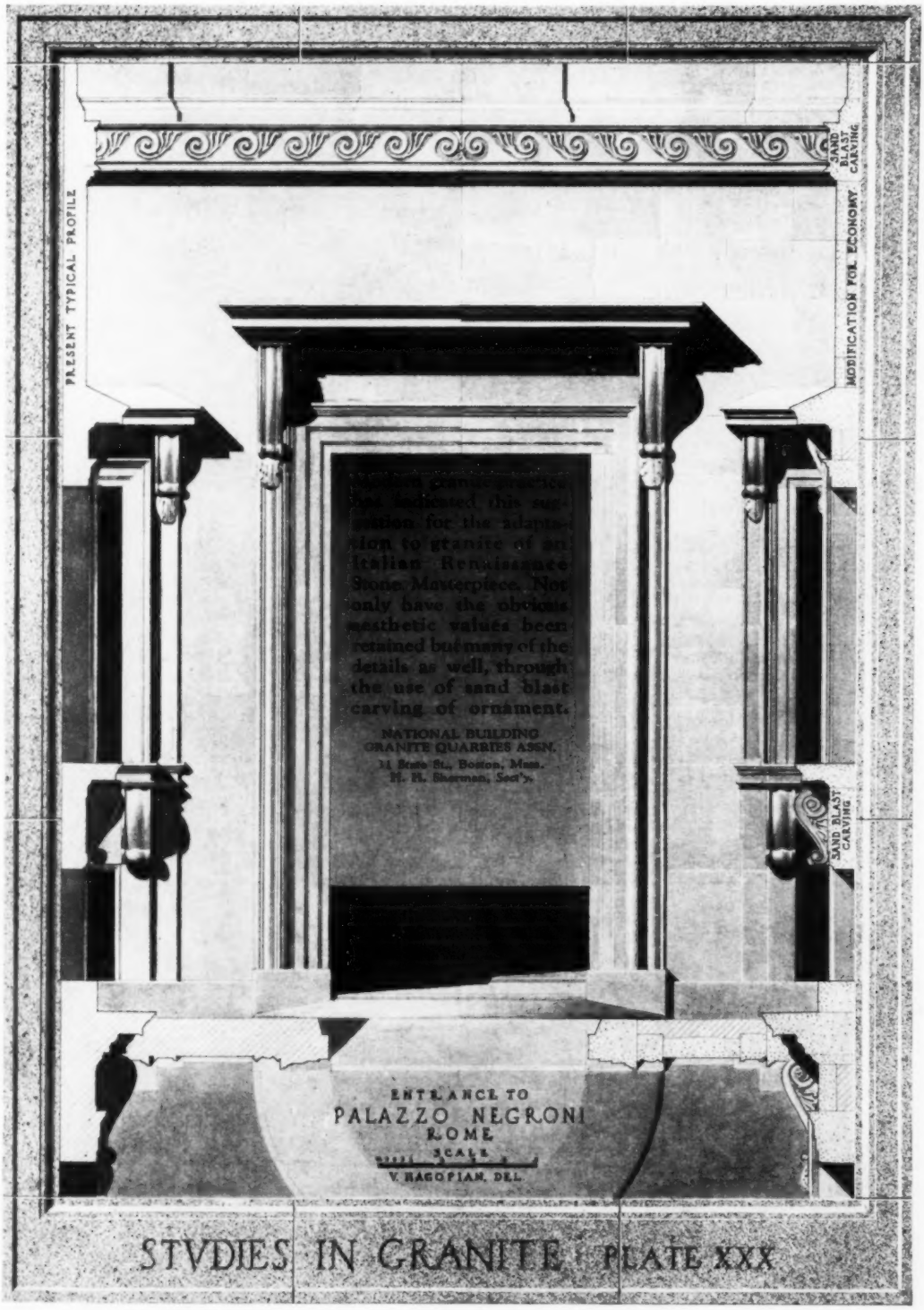
RICHARD E. BISHOP, Lynn O. Knowlton, Le Roy Carson, announce the consolidation of Richard E. Bishop with Bass, Knowlton & Co., for the practice of architecture and engineering under the firm name of Bishop, Knowlton and Carson, at 312 North Meridian Street, Indianapolis, Ind.

SHEFFIELD A. ARNOLD, landscape architect, announces the removal of his office from Boston to 47, West 34th Street, New York City, N. Y.

WALTER H. GOULD and Associates have opened an office for the practice of architecture in the Fremont Office Building at 407 Lincoln Ave., Bellevue, Pa.

ON October 4, 1927 Method Patent No. 1644114 was issued to C. A. Dunham and assigned to C. A. Dunham Company. This covers the Dunham Differential Vacuum Heating System, advertisements on which appear in our columns.

KENNETH B. WORTHEN, architect, announces the removal of his offices from 639 Endicott Bldg., St. Paul to 54 N. River Blvd., St. Paul, Minn.


PRESENT TYPICAL PROFILE
SAND BLAST CARVING
MODIFICATION FOR ECONOMY
Modern commercial practice has suggested this suggestion for the adaptation to granite of an Italian Renaissance Stone Masterpiece. Not only have the obvious aesthetic values been retained but many of the details as well, through the use of sand blast carving of ornament.
NATIONAL BUILDING GRANITE QUARRIES ASSN.
31 State St., Boston, Mass.
H. H. Sherman, Sec'y.
SAND BLAST CARVING
ENTRANCE TO
PALAZZO NEGRONI
ROME
SCALE
V. HAGOPIAN, DEL.
STVDIES IN GRANITE · PLATE XXX

On request a complete folio of these Granite Studies will be reserved for you.

Building Contracts Awarded

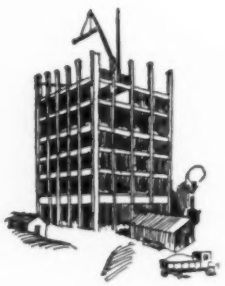
From the records of F. W. DODGE CORPORATION, Statistical Division. The figures cover the 37 states east of the Rocky Mountains and represent about 91 per cent. of the country's construction volume.

First Ten Months, 1927

Classification	Number of Projects	New Floor Space in Square Feet	Valuation	X
Commercial Buildings	18,454	124,418,500	$802,457,400	81%
Educational Buildings	4,039	47,053,400	324,806,800	96
Hospitals and Institutions	1,023	15,590,400	134,888,300	96
Industrial Buildings	4,676	59,446,000	411,169,300	43
Military and Naval Buildings	132	1,407,700	7,291,800	64
Public Buildings	945	7,268,900	64,032,900	88
Public Works and Public Utilities	14,290	7,581,700	1,095,088,400	7
Religious and Memorial Buildings	2,392	15,154,800	138,801,100	92
*Residential Buildings	108,428	411,626,300	2,151,073,600	63
Social and Recreational Buildings	2,514	28,027,000	229,688,300	89
Total	156,893	717,574,700	$5,359,297,900	60%

* 160,948 Buildings.

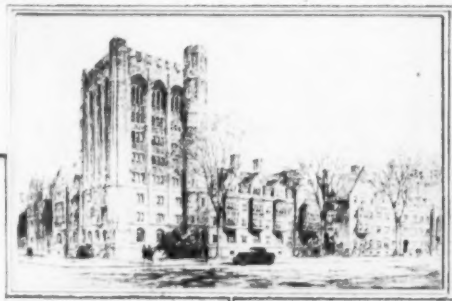
Column X gives approximate percentages of cost figures that normally represent value of work planned in architects' offices.



Comparative Data

Total Building Contracts—37 States

Period	Number Projects	New Floor Space in Square Feet	Valuation
Year 1926	170,722	883,691,700	$6,349,914,700
First 10 Months, 1927	156,893	717,574,700	5,359,297,900
First 10 Months, 1926	146,875	749,167,300	5,356,506,400



Bingham Hall, Yale University. Architect, W. B. Chambers. 12,000 square feet Pyrobar Roof Tile used

Harkness Hall, Yale University. Architects, Delano & Aldrich. 14,000 square feet Pyrobar Roof Tile used

Sterling Chemical Laboratory, Yale University. Architects, Delano & Aldrich. 42,000 sq. feet Pyrobar Roof Tile used

A GREAT UNIVERSITY REALIZES ITS VISION

Because habits of thought, generations old, bade them plan well, and build prudently and wisely, the great university that is Yale has created for itself a home that is a marvel of beauty, efficiency, and substantiality.

As building after building reared its walls, first the entire Harkness Quadrangle group, then the Sterling Chemical Laboratory, Harkness and Bingham Halls, were roofed with fireproof, enduring Pyrobar.

These Tile of white, cast gypsum provide a permanent, fireproof roof deck, light in weight, highly insulating and a secure nailing base for heavy slates. They will last as long as the walls that support them, sheltering, safeguarding and giving comfort to the sons of Old Eli that are to come.

Such building materials will bear knowing about in full. May we furnish the facts? Just send the coupon.

UNITED STATES GYPSUM COMPANY
General Offices: Dept. M, 300 W. Adams St., Chicago, Ill.

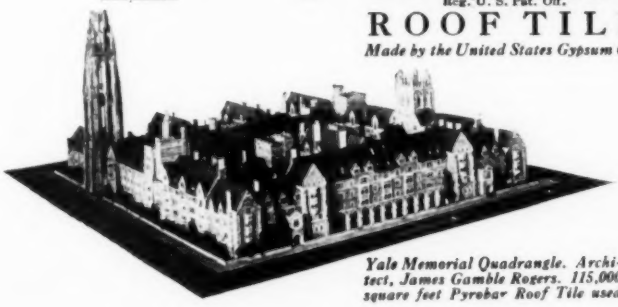
USG STANDARD BUILDING MATERIALS

PYROBAR

Reg. U. S. Pat. Off.

ROOF TILE

Made by the United States Gypsum Co.



Yale Memorial Quadrangle. Architect, James Gamble Rogers. 115,000 square feet Pyrobar Roof Tile used

MAIL THIS NOW!

UNITED STATES GYPSUM COMPANY
Dept. M, 300 West Adams Street, Chicago, Ill.

Please send your special architectural and engineering data on Pyrobar Roof Tile and other USG Fireproofing building materials.

Name.....

Address.....

In the ghiordes-knotted Whittall rug American genius has produced a fabric comparable with the finest products of Oriental marts—These rugs are so rich in tones and quality that one would imagine a price as prohibitive as the fabulous carpets of the ancient kings. Yet, the Whittall ghiordes-knotted rug may be had in room sizes from $345. and smaller rugs from $85. You are cordially invited to inspect them at the Whittall Salon

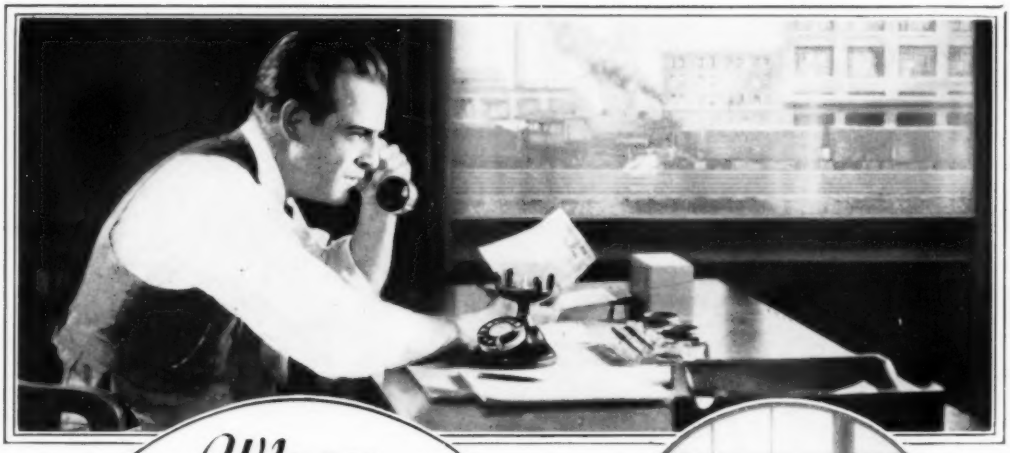
WHITTALL 5 EAST 57TH ST NEW YORK

The Whittall ghiordes-knotted rug is unmatched in modern rug craftsmanship

Plate 13

Entrance Hall
An early english treatment suggested entirely by designs in our book "Old English Designs." The side walls are of cast stone, the ceilings are parged.

Jacobson & Company.
Authentic Plaster Ornament
241 E 44 St. N.Y.C.



When TIME Counts

WHEN last minute telegraph orders come in—when quick, overnight shipments must reach their destinations on time—it is in emergencies such as these that P-A-X, in the full power of mechanical perfection, serves the needs of the hurrying office and shipping force with a surety, swiftness and accuracy not humanly possible.

This same promptness and surety of operation that has led large mail order houses such as Montgomery Ward and Co., Sears, Roebuck and Co., and National Cloak & Suit Co., to adopt P-A-X instant service, also accounts for its installation by more than 2000 of the largest manufacturing and industrial organizations and business firms in the United States and abroad.

~Count on

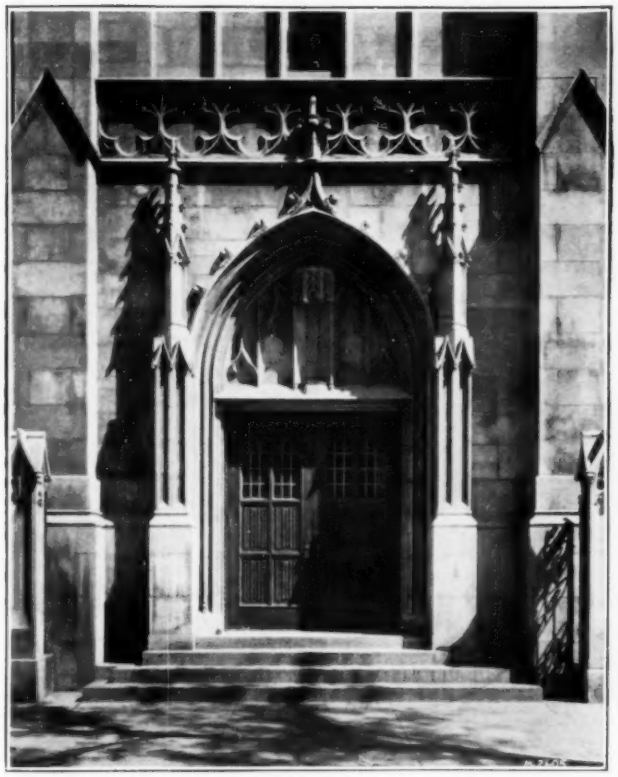
STROWGER P-A-X PRIVATE AUTOMATIC EXCHANGE

The P-A-X is, fundamentally, a private automatic telephone exchange built of the same Strowger type of automatic telephone equipment being so widely adopted for city service. The P-A-X may be furnished to include and co-ordinate such services as code call, conference, executive's priority, emergency alarm, etc., to meet individual needs.

Automatic Electric Inc.

Engineers, Designers and Manufacturers of the Automatic Telephone In Use the World Over.

Home Office and Factory, CHICAGO, ILL. Branch Offices in all principal cities.



Side Entrance, St. Ita's Church, Broadway and Catalpa Avenues, Chicago.
Henry J. Schlacks, Architect.

A Perfect Expression of the Architect's Design

THAT Indiana Limestone gives perfect expression to the beauty of the architect's design is evidenced by this view of St. Ita's Church. This fine, light-colored building stone completely fulfills every requirement of church architecture. It has become practically standard for churches of both Gothic and Renaissance types and is being used increasingly for other styles of design. The service on Indiana Limestone now being rendered by Indiana Limestone Company makes the use of this building stone more attractive than ever to the architect.

INDIANA LIMESTONE COMPANY

General Offices: Bedford, Indiana *Executive Offices:* Tribune Tower, Chicago

FALLS SIXTEEN STORIES, KILLS WOMAN; DIES

Window Washer's Plunge From Loop Building Hurts Another; Dead Victim Mother of Five

WINDOW WASHER FALLS; MAY DIE

NEW HAVEN, May 7.—(AP) Daniel Zuk, thirty-two, of this city, employed as a window washer by the Connecticut Window Cleaning Co., fell from the third story of a building

Falls to Death

THE diagram below shows how Leonard Maring, 24, window washer, fell eight stories from the Conway Building, Clark and Washington sts., to death, yesterday.—Herald and Examiner photo.

Window Cleaner Killed When His Foot Slips

CLEANER DIES IN FIVE-STORY FALL

Washer Loses Footing as He Adjusts Belt.

Photo on Picture Page

WINDOW CLEANER FALLS TO DEATH

(By The Associated Press)

HARTFORD, Aug. 7.—A fall of four stories to the pavement below resulted in the death of Andrew Protosevich of Windsor an employee of the Sanatas window cleaning

Columbus Man Falls 13 Floors to Death

COLUMBUS, O., June 11.—(By A. P.)

The Selection of Williams Equipment Prevents these Accidents

Williams Reversible Window Equipment makes the sash completely reversible for cleaning. Both sides of the glass may be cleaned from inside the room at floor level and the risk of outside cleaning is entirely eliminated.

The Safer Way is the Cheaper Way

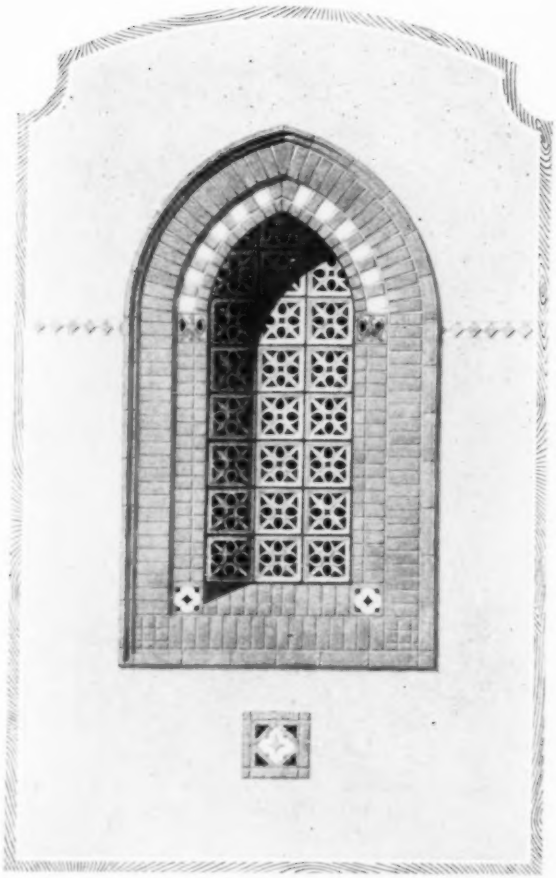
Inside cleaning may be done by regular employees and the building owner saves every year on the cost of window washing. There is no risk to the cleaner, and as a result a substantial saving in wages and in compensation insurance.

Complete information and details of construction will be gladly furnished on request.

The Williams Pivot Sash Company

East 37th Street at Perkins Avenue
Cleveland, Ohio

WILLIAMS REVERSIBLE WINDOW EQUIPMENT



THE TWELFTH OF A SERIES OF INFORMATIVE ADVERTISEMENTS ON PATTERN IN TILEWORK

—PATTERNED WINDOW GRILLES—

In this day when it is so often found necessary to "grille" a window in order to break up a view from the street, PATTERNS in pierced tiles come forward to aid the designer. What architect sketching in the Byzantine area or the Near East has not been impressed by the splendid opportunities offered by the "latticed" windows of these lands? For architecture, especially in the sunnier parts of our country, there is great need for just such expedients. Much of the charm of old Byzantine and Saracenic Persian grilles is to be captured by the medium of modern pierced tiles. These set within a colorful enframement of ceramic units offer a splendid range of possibility and effect, the value of which is today only guessed at. Such PATTERNED inserts in either *brick* or *stuccoed* walls should be quite the making of a design otherwise kept extremely simple and unostentatious.

ASSOCIATED TILE MANUFACTURERS

220 Graybar Building 420 Lexington Avenue New York, N. Y.

ALHAMBRA TILE CO., Newport, Ky.
AMERICAN ENCAUSTIC TILING CO., Ltd., Zanesville, Ohio
CAMBRIDGE TILE MFG. CO., Covington, Ky.
FEDERAL TILE CO., Columbus, Ohio
GRUEBY FAIENCE & TILE CO., Perth Amboy, N. J.
MATAWAN TILE CO., Matawan, N. J.
MOSAIC TILE CO., Zanesville, Ohio
NATIONAL TILE CO., Anderson, Ind.
OLEAN TILE CO., Olean, N. Y.
THE C. PARDEE WORKS, Perth Amboy, N. J.
ROSSMAN CORPORATION, Beaver Falls, Pa.
STANDARD TILE CO., Zanesville, Ohio
THE SPARTA CERAMIC CO., East Sparta, Ohio
UNITED STATES ENCAUSTIC TILE WKS., Indianapolis, Ind.
UNITED STATES QUARRY TILE Co., Parkersburg, W. Va.
WHEELING TILE CO., Wheeling, W. Va.

ASSOCIATION TILES

Made in U. S. A.

View of Several Houses in Cedar Park Village, an Addition to Philadelphia.

Outside Beauty and Inside Excellence

Architect E. Allen Wilson, in planning a large number of new homes in the addition known as Cedar Park Village, Philadelphia, determined to have something better than the average "operation."

These attractive homes embody not only outside beauty, no two being alike, but the interiors are as varied as the exteriors. And the best materials were selected throughout.

As a natural result he chose

Franklin Vitrified Pottery Lighting Fixtures

Their beauty enhanced the general effect and their many colors gave an opportunity for diversity, yet harmony with any decorative scheme. These fixtures are one of the attractions of the homes—one of the items of pride to the owners.

See our catalogue in Sweet's, or ask for full data, A. I. A. File, No. 31-F-23.

TILE—"Selected, Sealed and Certified"

Franklin Pottery manufactures, in colors to harmonize with its Vitrified Pottery Lighting Fixtures, a full line of:

MEMBER ARTISTIC LIGHTING EQUIPMENT ASSOCIATION

White and Colored Wall Tile.
Glazed and Unglazed Floor Tile.
Faience Tile for Floor and Wall use.
Bathroom Accessories.
Vitrified Pottery Switch Plates.
Ceramic Mosaic Floors.
Franklin Flint Floors.
Special Frostproof Tile for exterior use.
Decorative Panels for individual uses.
Stock Designs in Mantels, Fireplaces, Fountains, Panels, Inserts, etc.
Special designs submitted and executed.

Our white wall tile is "Selected, Sealed and Certified," in accordance with "Simplified Practice Recommendation No. 61" of the United States Department of Commerce.

"A Complete Service"

A National Organization

© 1927

FRANKLIN POTTERY

Franklin Pottery
[A CORPORATION]
Lansdale, Pa.

Plans! Their Success Depends on 'Known' Materials

NO FINE design ever realized itself through poor materials. An owner loses the value of good plans, unless protected by specifications drawn up to definite standards of quality and fitness.

In this regard it is only sound judgment to specify Plumrite Brass Pipe for hot and cold water lines. Plumrite is rustless—it will never clog or deliver reddish water. It is one of the 'known' materials that is uniformly good. Architects have been selecting it for many of our greatest buildings—starting 40 years ago.

Any home builder making a sizeable investment does not want to pay for pipe that soon will need to be replaced. That's another reason for Plumrite—the standard brass pipe.

Plumrite is trade-marked every three inches.

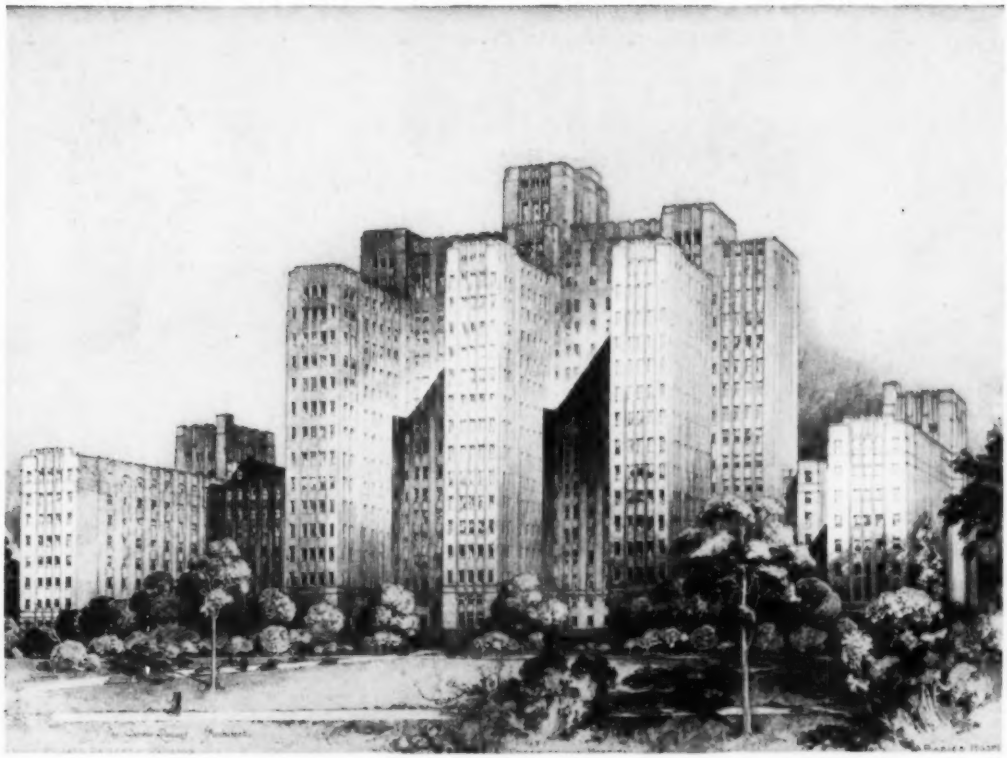
"Bridgeport" BRASS TRADE CO. MARK

BRIDGEPORT BRASS

PIPE FITTINGS FLUSH VALVES TUBULAR PLUMBING GOODS

Plumrite Plumrite Plumrite Plumrite

Bridgeport Brass Co., Bridgeport, Conn. - New York - Philadelphia - Chicago - Detroit - Cleveland



The Columbia Presbyterian Medical Center, New York City
Jas. Gamble Rogers, Architect

Meeting a Great Hospital's Requirements

A HOSPITAL can't afford pipe that needs to be torn out and replaced because of leaks or reduced flow. The hospital's service goes on night and day. Reliability must characterize its equipment.

Water pipe that complies with the rigid sanitary law of this hospital is safe in any installation. Where else is there such a demand for pure water, always available? Plumrite brass pipe guarantees a constant supply, as long as delivered from the main—a service that miles of Plumrite brass pipe render without attention or thought.

"Bridgeport" BRASS TRADE MARK CO.

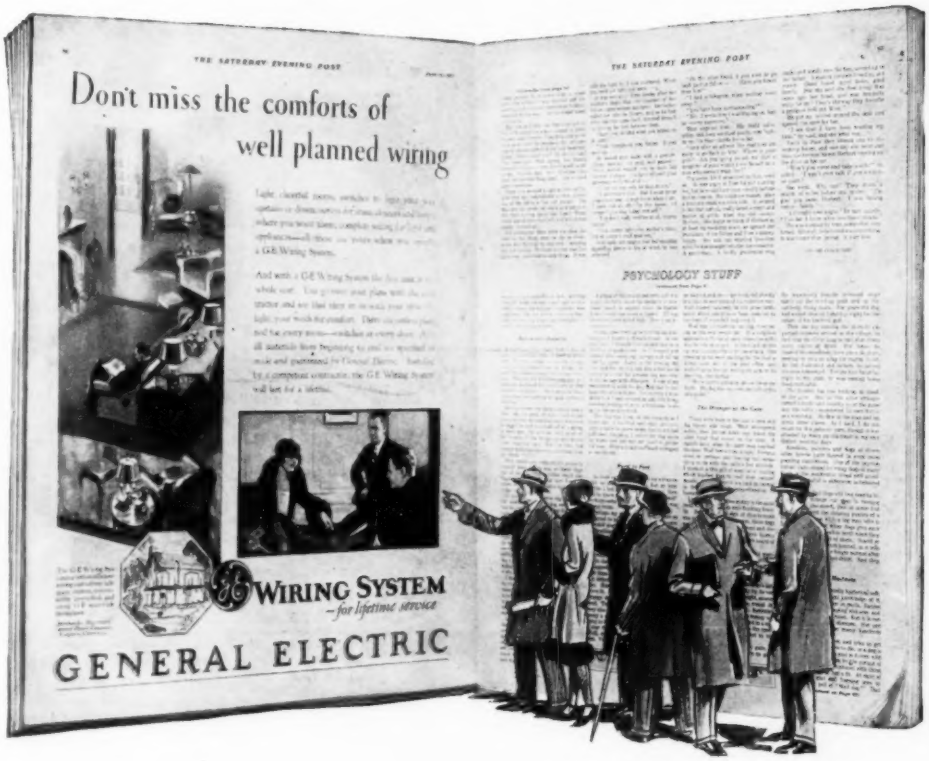
Architects may obtain our literature describing specific brass pipes for different uses. Simply mail a card to Bridgeport.

BRIDGEPORT BRASS

PIPE FITTINGS FLUSH VALVES TUBULAR PLUMBING GOODS

Plumrite Plumrite Plumrite Plumrite

Bridgeport Brass Co., Bridgeport, Conn. - New York - Philadelphia - Chicago - Detroit - Cleveland



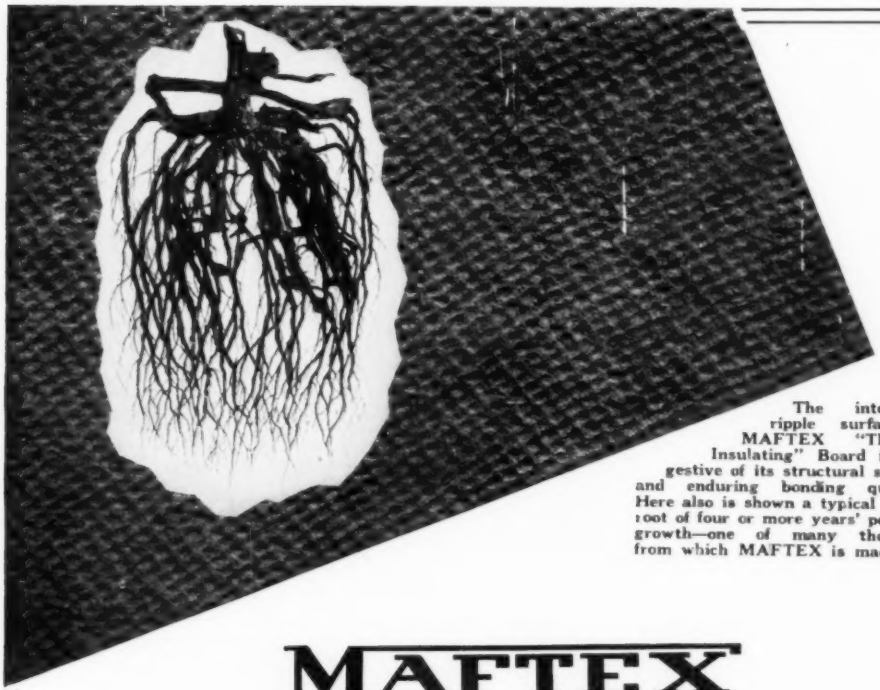
Have you the "Electrical Specification Data for Architects" in your files? If not, write us for your copy.

Merchandise Department
General Electric Company
Bridgeport, Connecticut

A G-E Wiring System is the wiring installation that reveals most completely an architect's plan for comfort, convenience and economy. Yet it is the easiest and simplest to specify! Wide advertising has made it well known to every client as the highest quality wiring you can give him.

WIRING SYSTEM
–for lifetime service

GENERAL ELECTRIC



The interesting ripple surface of MAFTEX "Thermal-Insulating" Board is suggestive of its structural strength and enduring bonding qualities. Here also is shown a typical licorice root of four or more years' perennial growth—one of many thousands from which MAFTEX is made.

MAFTEX

The "Thermal-Insulating" Board that has structural strength

A large and steadily increasing percentage of the buildings which architects design call for "Thermal-Insulation."

MAFTEX gives effective insulation and more—structural strength that permits its use not merely as a supplement to, but also in place of, wooden sheathing and interior lathing.

MAFTEX may be used "direct" upon the outside of roof rafters, with confidence that it will *stop* the passage of heat while withstanding construction strain, atmospheric changes, and the ravages of time.

MAFTEX, used "direct" upon interior walls and ceilings, forms a bond with gypsum plaster that never loosens.

Are you receiving and reading the Bulletins for Architects that describe the various insulation-structural applications of MAFTEX "Thermal-Insulating" Board for every type of building?

Your office should be on the mailing list for this series. Prepared in accordance with A.I.A. filing requirements.

MACANDREWS & FORBES COMPANY

Business established in U. S. A., 1870

200 FIFTH AVENUE
NEW YORK, N. Y.

ADDITIONS TO AMERICA'S NOTABLE STRUCTURES—*No. 11 of a Series*

St. Lukes Hospital, Cleveland *(Architects, The Hubbell & Benes Co.—The Smith & Oby Co., Plumbing Contractors)*

No. 605
Attractive vitreous china wall fountain

No. 625
Recessed wall type, very popular

Automatic Stream Control

This is a patented feature—only obtainable in Halsey Taylor Drinking Fountains. Two-stream projector—automatic stream control! Lips need never touch projector; water never too high, never too low, regardless of pressure variation Sanitary—*practical!*

No. 623
Square design vitreous china wall type

No. 603
Vitreous china wall type at modest price

Design, too!

Although the determining factor in the selection of Halsey Taylor Drinking Fountains by leading architects is sanitation, yet design has not been sacrificed. Each model is attractively formed to harmonize with the plans in mind!

Variety, too!

The many varied needs of the architect can be suitably met by Halsey Taylor Drinking Fountains. Wall, pedestal, battery and cooler types are offered, as well as special designs and colored models.

THE HALSEY W. TAYLOR CO.—WARREN, OHIO

Largest Makers of Drinking Fountains Exclusively

Write for Architects' Catalog

HALSEY TAYLOR
Drinking Fountains
Automatic Stream Control

Offices in Principal Cities

Von Duprin

Self-Releasing Fire Exit Latches

Sweets, Pages B1876-1879.

AIA 27c5

Probably the most nearly perfect joy is that of creating a supremely fine thing--whether a painting, a building, or a fire exit latch.

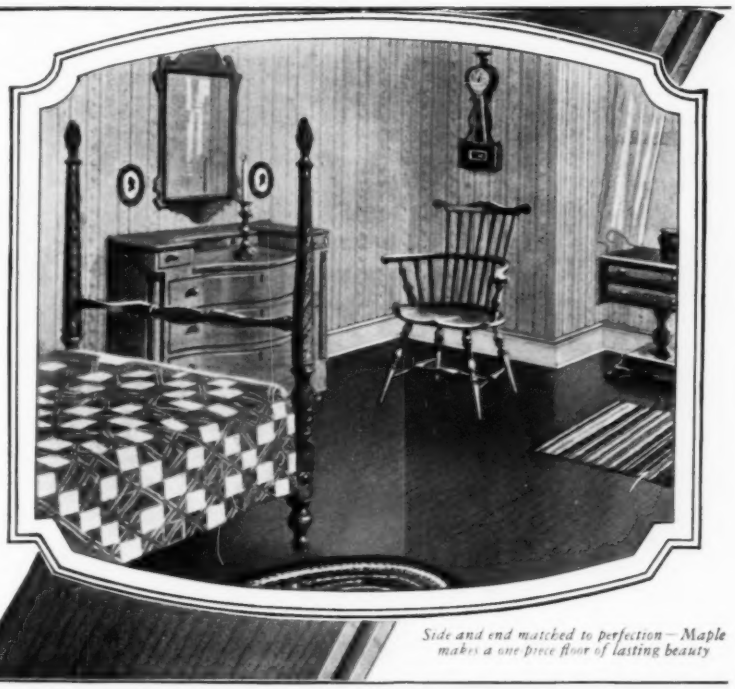
VONNEGUT
HARDWARE CO.
Indianapolis, Ind.

1852 *Our 75th Anniversary* 1927

Some of our standard colors:

Natural
Early American
Spanish Brown
Autumn Brown
Silver Gray
Dove Gray
Royal Blue
Pastel Green
Seal Black

The above colors can only be obtained by using stains manufactured by Marietta Paint & Color Co., Marietta, Ohio.



Side and end matched to perfection—Maple makes a one-piece floor of lasting beauty

Maple Floors in Color!

Never before possible—now yours at moderate cost

FOR years, home builders have wanted it—architects and interior decorators have hoped for it—scientists have experimented to make it a reality. Today you can have it for any room in your home.

A stained Maple Floor! In any tone you choose. From light, cool green to deep, mellow brown—from delicate sky blue to rich, rare ebony.

By a marvelous new process, color stain is made to penetrate deeply the extremely tight yet uniquely beautiful grain of Northern hard Maple. And with this transparent, even staining, the lovely pattern of the wood grows more visible—develops an even greater charm.

Thus Maple, long known to be the smoothest, most comfortable, most enduring of all fine flooring materials, becomes the most versatile in point of color harmony.

If you are planning to build or re-floor let Northern hard Maple bring into your home this delightful new element of color and the homelike atmosphere which only a product of nature can produce. And realize that in choosing Maple you assure yourself, at reasonable cost, of flooring satisfaction that will last as long as the home itself. Write for the free illustrated booklet, "The New Color Enchantment in Hard Maple Floors."

MAPLE FLOORING MANUFACTURERS ASSN.
1774 McCormick Building, *Chicago, Illinois*

Guaranteed Floorings

MFMA The letters **MFMA** on Maple, Beech or Birch flooring signify that the flooring is standardized and guaranteed by the Maple Flooring Manufacturers Association, whose members must attain and maintain the highest standards of manufacture, and adhere to manufacturing and grading rules which economically conserve these remarkable woods. This trademark is for your protection. Look for it on the flooring you use.

Floor *with* Maple

QUALITY
SERVICE

RIGHT PRICES
COURTEOUS
TREATMENT

IMPERIAL SQUIRREL CAGE MOTOR

Architects Demand Quiet Smooth-Running Motors

Building Owners are no longer Satisfied with noisy type equipment

Engineers and Architects in the Building Industry are quickly learning that Imperial is right in contending that a Quiet Motor must be *designed* to be Quiet—that Quietness must be a *fundamental* feature of the design.

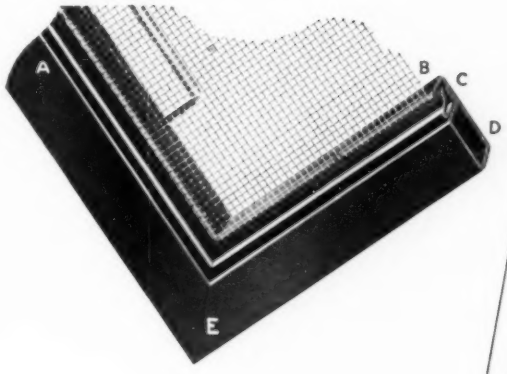
Many *good* motors are noisy—but a *good* motor can be Quiet and Smooth-running.

Ask any of our Branch managers to show you these Quiet Imperial Motors which are doing a good job right in your own city. We feel sure this will convince you why the Building Industry is taking such a large percentage of our production.

Let's discuss this more in detail

The Imperial Electric Co.
FACTORY-AKRON, OHIO.
MANUFACTURER SINCE 1889 of MOTORS and GENERATORS for EVERY PURPOSE

QUALITY
SERVICE
RIGHT
PRICES
COURTEOUS
TREATMENT



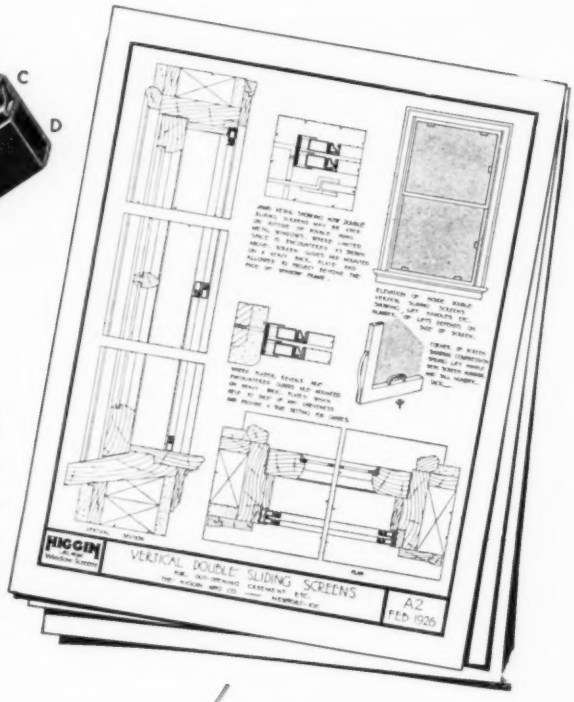
A Narrow all metal frames assure strength and durability and do not cut off light.

B Bronze wire mesh resists corrosion.

C Splines forced into frames hold cloth taut permanently. Removable in case cloth is damaged and requires replacement.

D Frames enameled inside as well as out to prevent rust.

E Corners, set with driving fit over inside corner angles, remain rigid.



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THAT Higgin Screens do last and therefore cost less is amply proved by their records. Read what Mr. F. E. Ames, of Brookline, Mass., says:

> "For twenty-nine years your screens have gone in the middle of May and come off about November 1. They have held their shape perfectly. With continued good care such fine screens deserve, they should last many years more. It certainly was a paying investment when we got them in 1898."

Higgin gives architects valuable help in planning screen and weatherstrip equipment for homes and other buildings. A portfolio containing the details shown above will be sent on request. In addition, the advisory and estimating service of Higgin trained experts is offered. The local representative will come to your office at your call and discuss screen and weatherstrip problems with you. If his name is not in your telephone directory, write the home office direct.

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General Offices: 512 Washington Ave., Newport, Ky.
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HIGGIN
ALL METAL
Window Screens

Note this new file number for screens —
A. I. A. File No. 35-P-1

Detail for Screens!

Higgin Screen and Weatherstrip Drafting Room details sent on request.

A. I. A. File No. 35-P-1 (Screens)

The residence of Mr. F. E. Ames, Brookline, Mass., was equipped with fifty-two Higgin All-Metal Screens in 1898, and they are still in service.

ARTISTS thrill with pleasure over the prospect of sketching such a scene as this. Earl Horter did. And what's more, he used the best pencil he knew—Dixon's Eldorado—to picture the unusual charm of this quaint Alsatian village.

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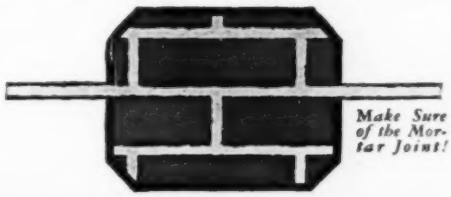

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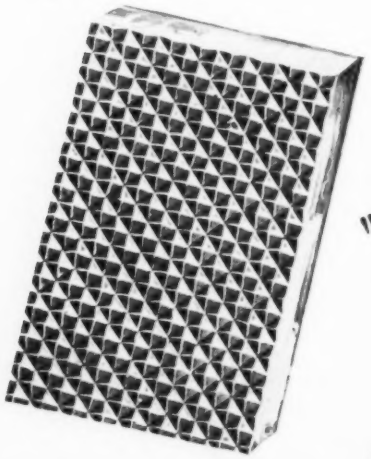

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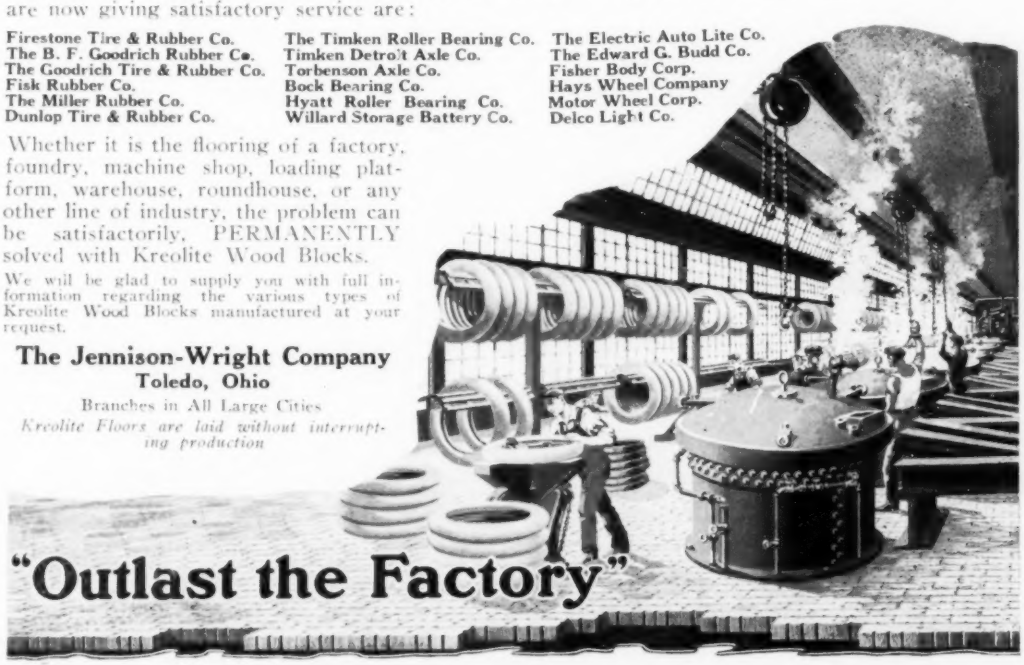

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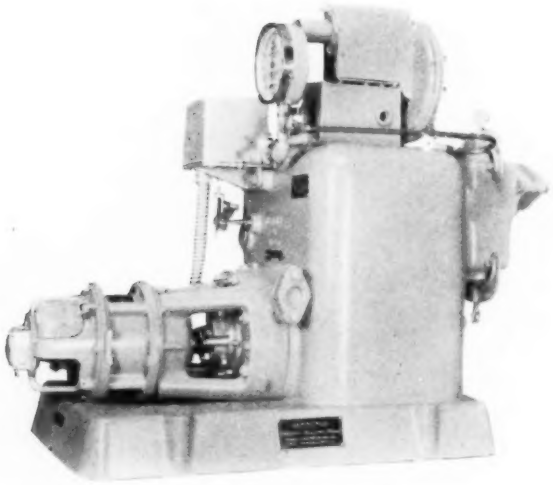

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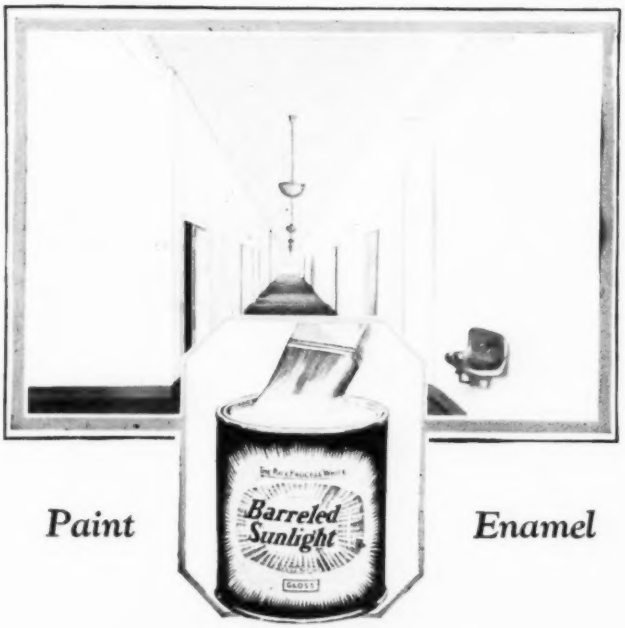

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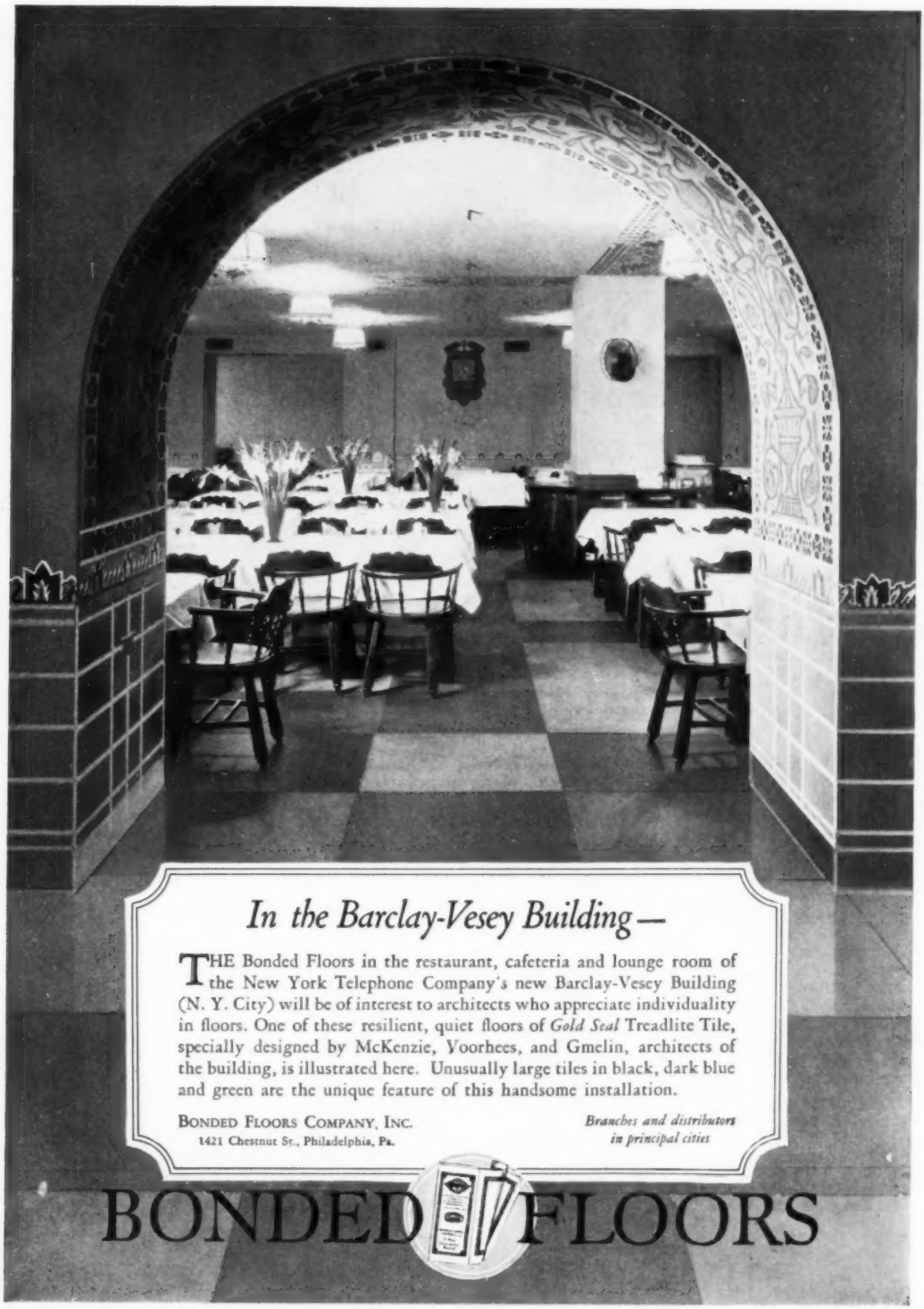
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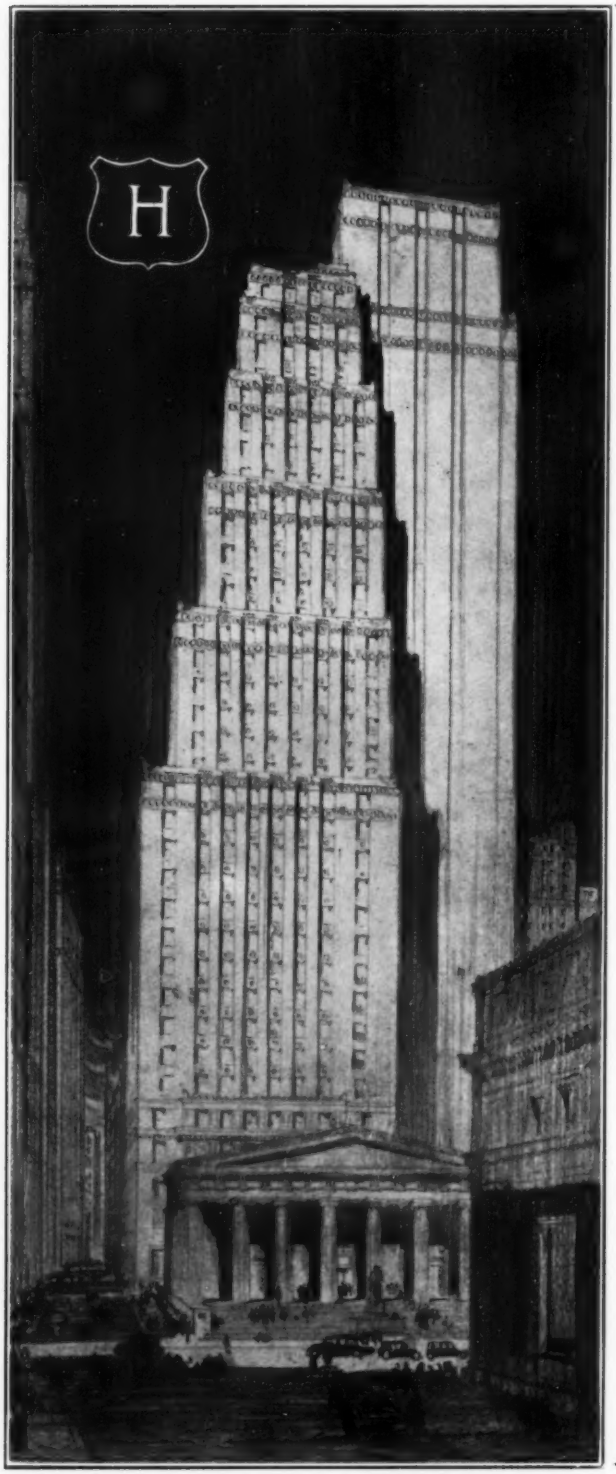

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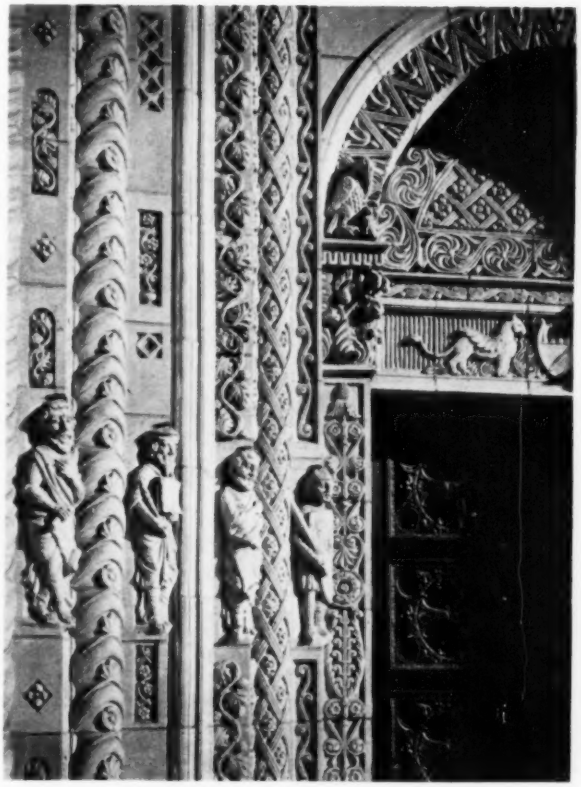

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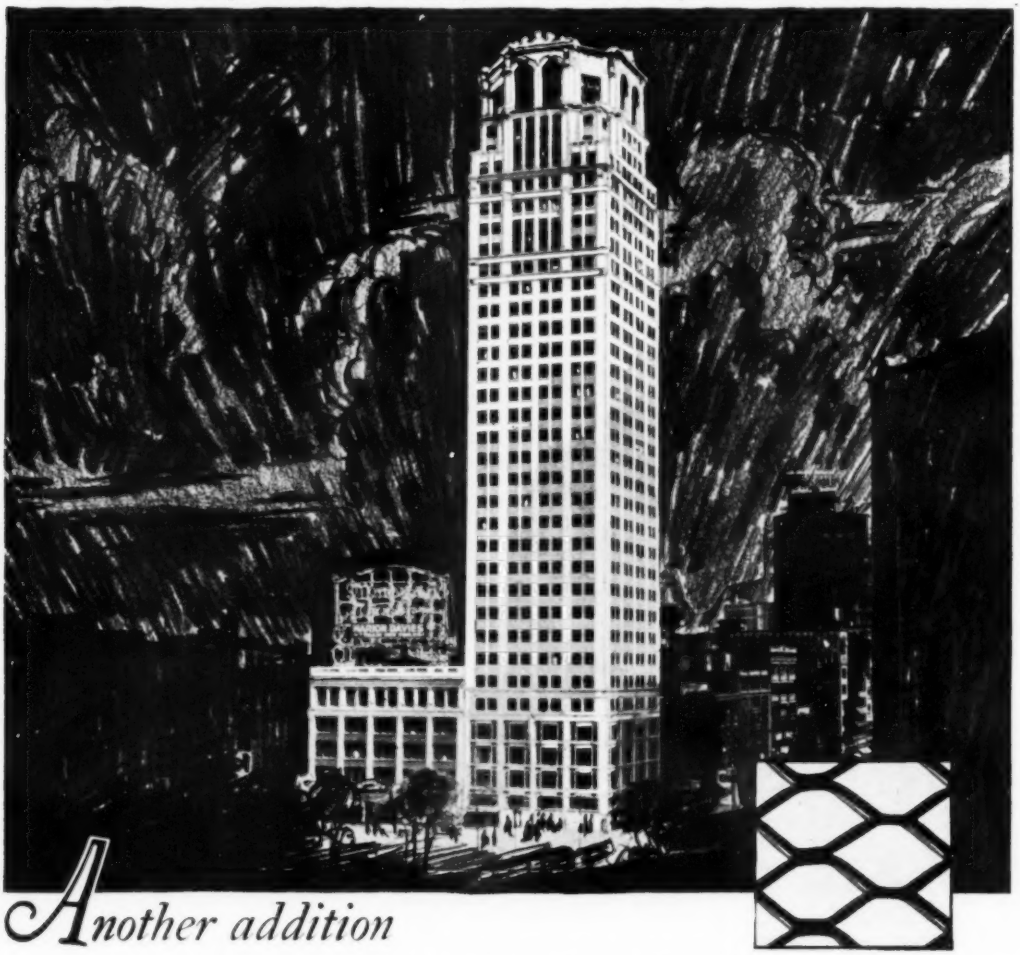

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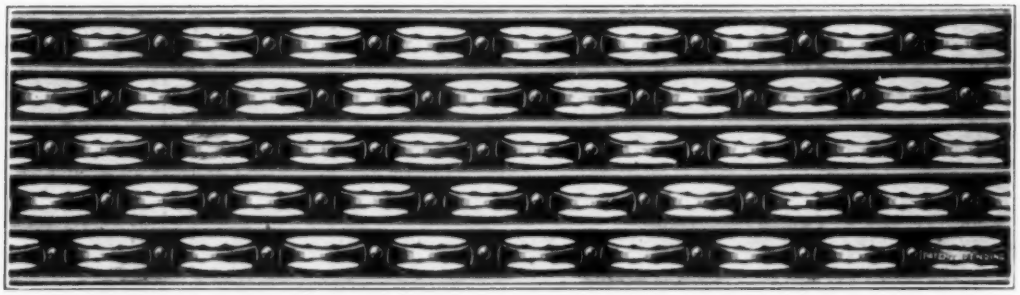

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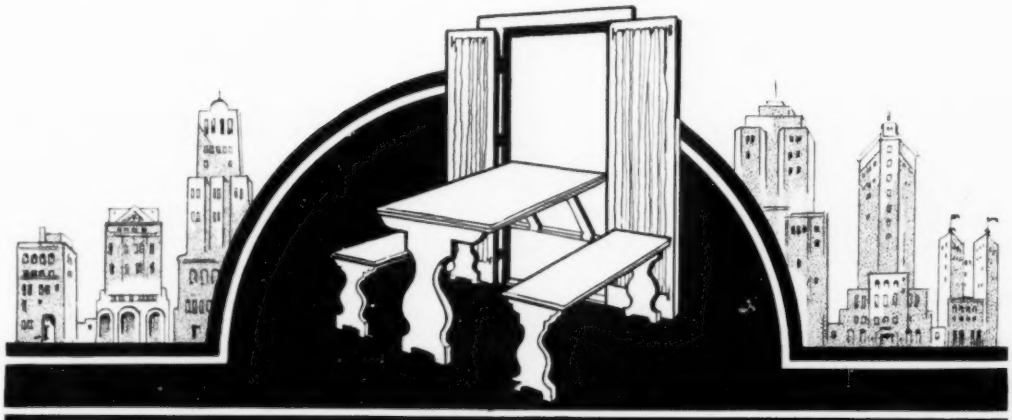

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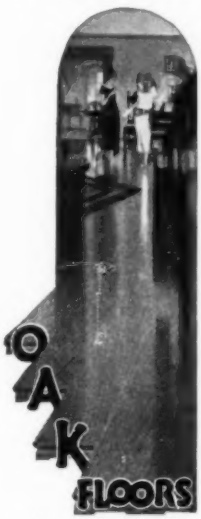

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Hotel Tuller, Detroit, Mich.

In 1905—Oak Floors
again
In 1914—Oak Floors
and again
In 1924—OAK FLOORS

Every room in the three units of the Hotel Tuller now has oak floors. The first unit was constructed in 1905, and oak floors were laid in all the rooms. Again in 1914, the second unit was similarly equipped.

These installations, demonstrating through nineteen and ten years continuous service, the worth of oak floors, were their own best advertisement in inducing the owners to again select oak for the final unit, just completed.

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Guests like to be in homelike surroundings. There is something in the very "feel" of oak beneath the feet that suggests home, and imparts a friendly atmosphere. Its beauty becomes a part of the decoration of an attractive modern hotel room.

The durability and cleanliness of oak floors appeal to far-sighted hotel management. Such floors are permanent, and never need replacement. Cost of upkeep is reduced, as a minimum amount of attention keeps them in perfect condition. Furthermore, oak floors are sanitary; no dirt can accumulate on the bright polished surface.

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The advantages of oak flooring are fully brought out in literature available for architects' reference files. The new color finishes which harmonize with room decoration are illustrated in "The Story of Oak Floors" which we will send you upon request. Use this coupon today.

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This overwhelming endorsement of the Whale-bone-ite Seat is the result solely of the long dependable service which this finest of toilet seats gives. Architects have found that "just as good" seats were not the same.

The marvelous Whale-bone-ite Seat is made of a heavy layer of the substance called Whale-bone-ite molded when soft under tremendous pressure into shape around a core of laminated, alternating-grain layers of hardwood.

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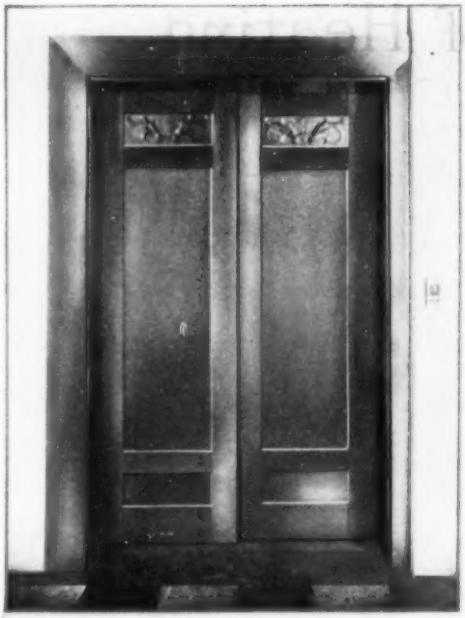
For free cross-section of a Whale-bone-ite Seat, address Dept. 162 Seat Division, The Brunswick-Balke-Collender Co., 623 South Wabash Avenue, Chicago



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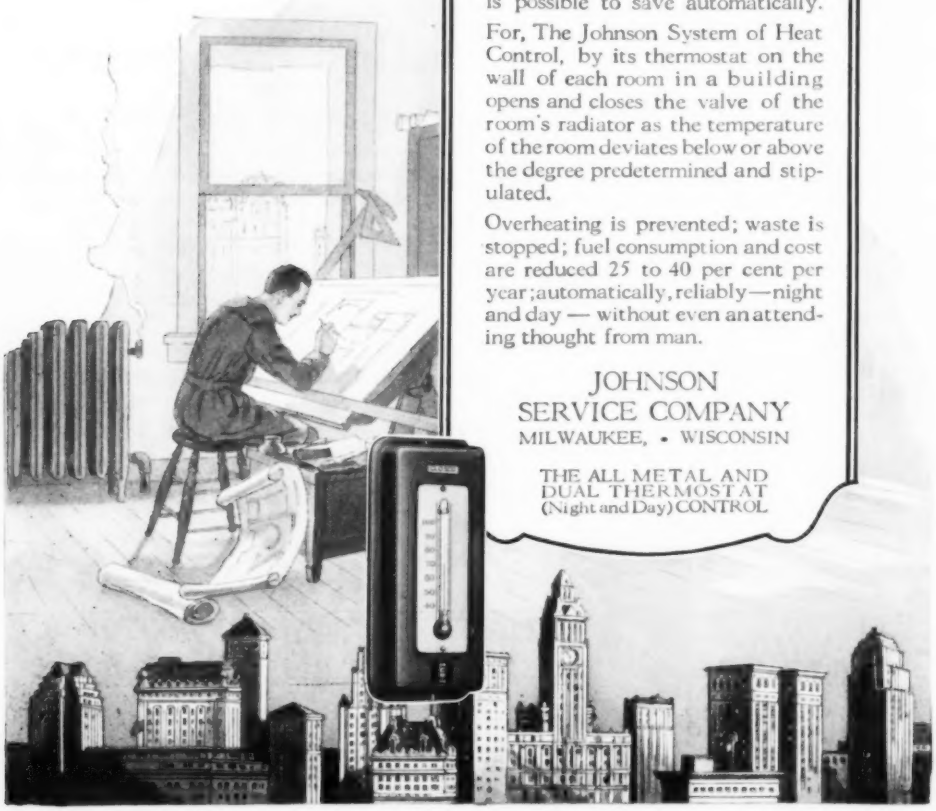

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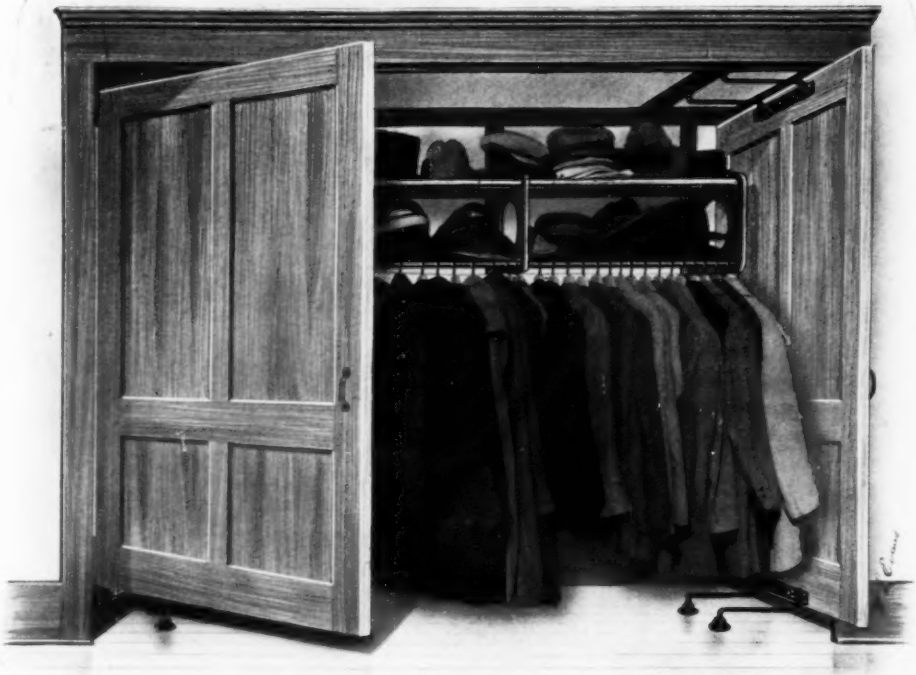

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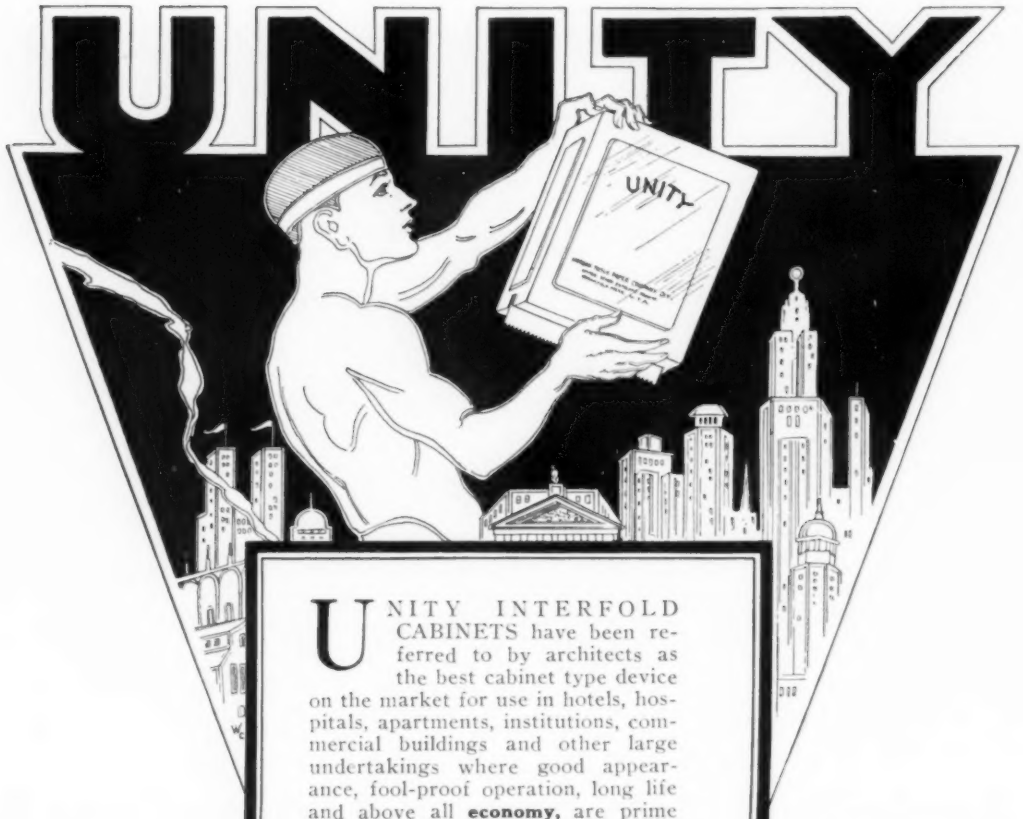

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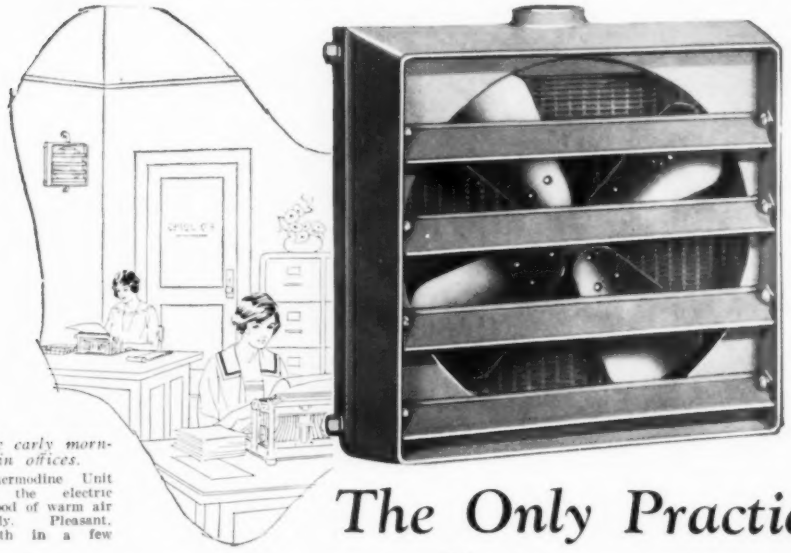

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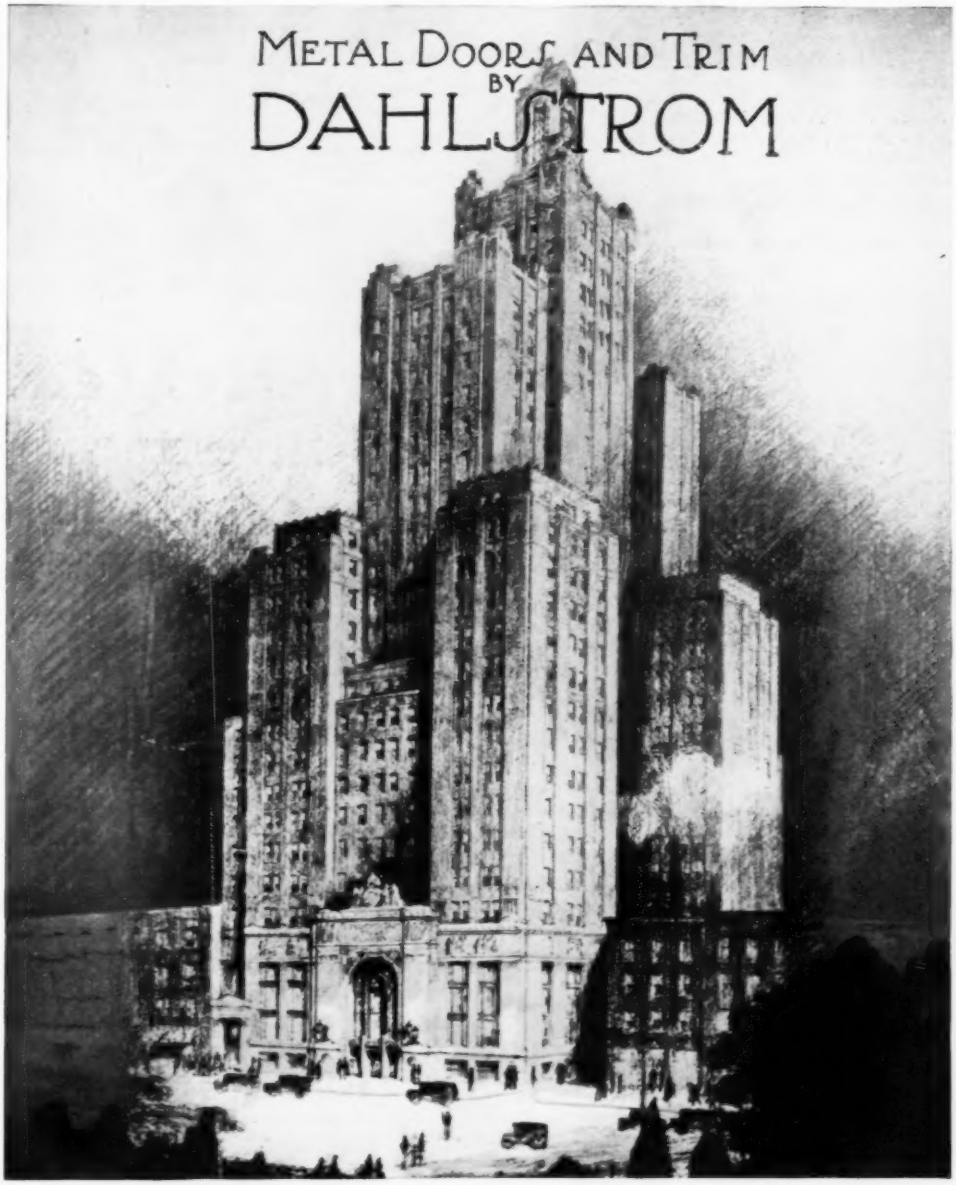

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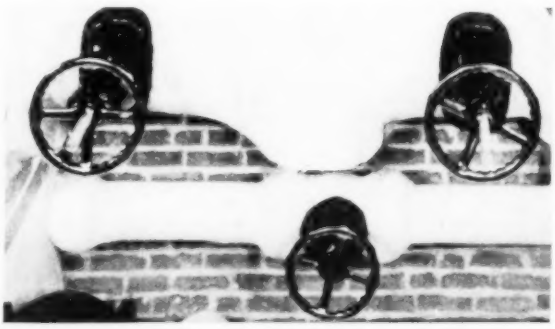
Below: Fred F. French Building, 551 Fifth Avenue, New York City. Fred F. French Co., Architects; Baker Smith & Co., Heating Contractors; W. G. Cornell Co., Plumbing Contractor.



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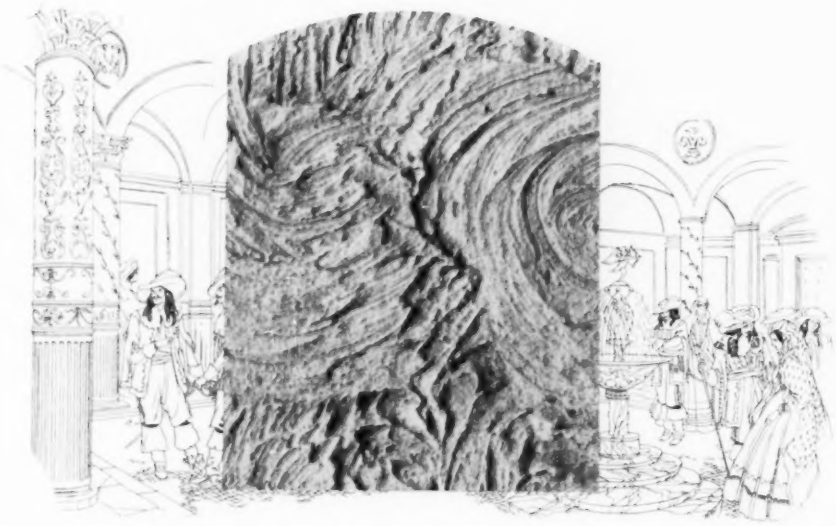

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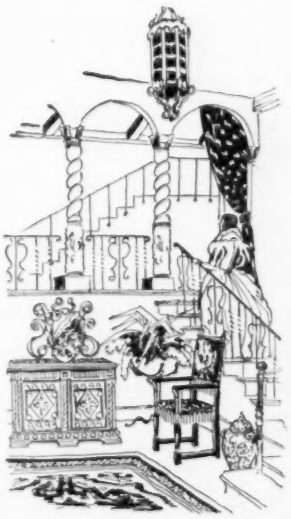

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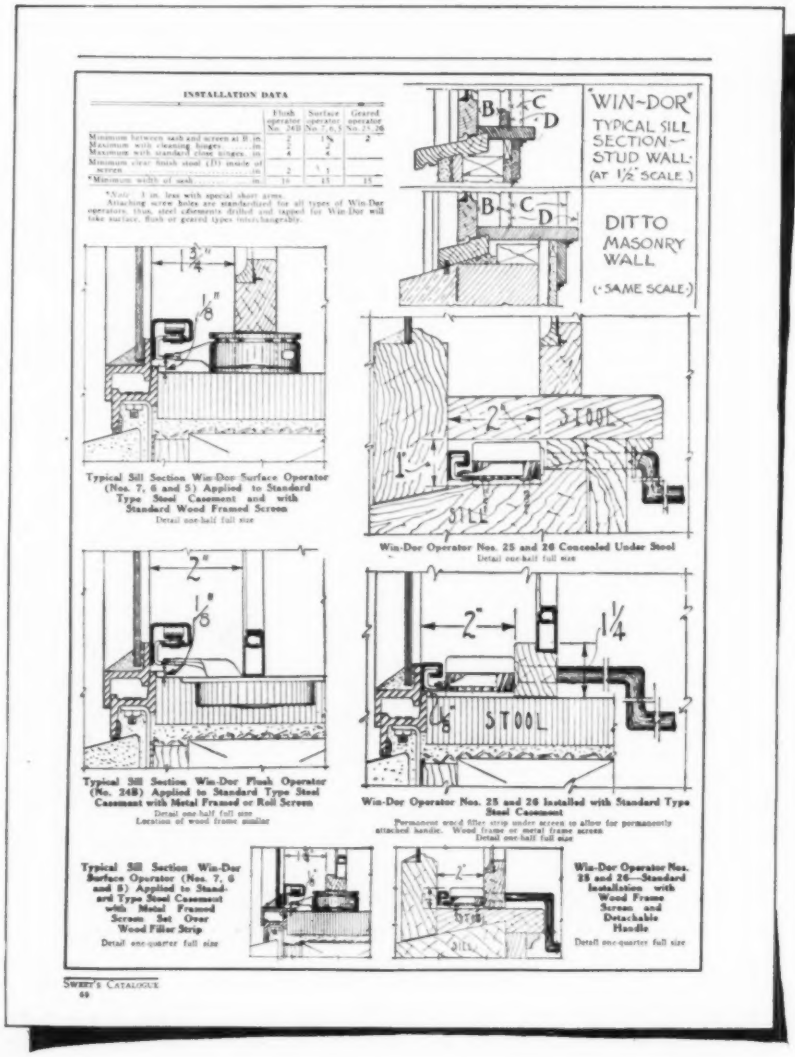
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Win-Dor Operator Nos. 25 and 26 Concealed Under Stool
Detail one-half full size
Typical Sill Section Win-Dor Flush Operator (No. 24B) Applied to Standard Type Steel Casement with Metal Framed or Roll Screen
Detail one-half full size
Location of wood frame smaller
Win-Dor Operator Nos. 25 and 26 Installed with Standard Type Steel Casement
Permanent metal filler strip under screen to allow for permanently attached handle. Wood frame or metal frame screen
Detail one-half full size
Typical Sill Section Win-Dor Surface Operator (Nos. 7, 6 and 5) Applied to Standard Type Steel Casement with Metal Framed Screen Set Over Wood Filler Strip
Detail one-quarter full size
Win-Dor Operator Nos. 25 and 26—Standard Installation with Wood Frame Screen and Detachable Handle
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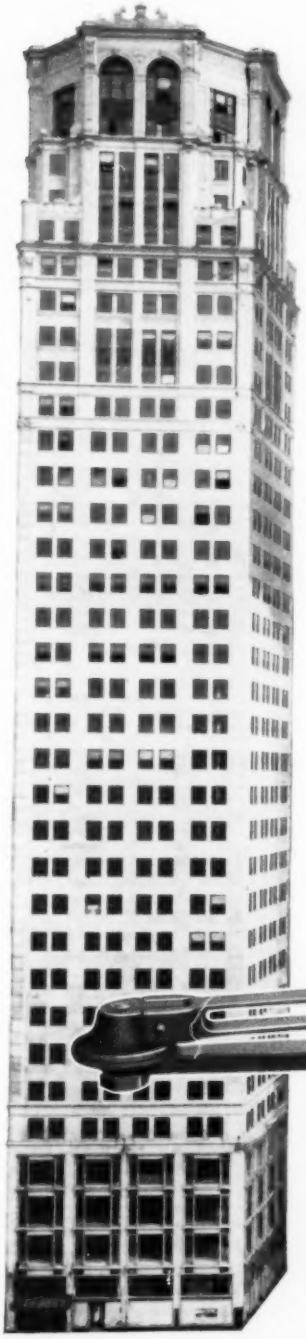

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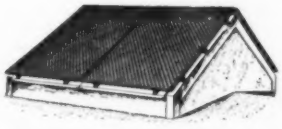

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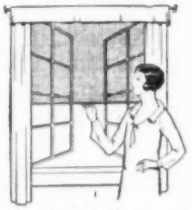

IN-VIS-O Rolls up and down like a roller shade. Out of sight, out of the way, out of the weather when not in use. Permits full freedom of vision when in use. Ideal for casements or double-hung sash. Used in thousands of homes costing under $10,000.

PAUL G. HOFFMAN had installed IN-VIS-O Disappearing Roller Screens in his Los Angeles home. Naturally, when he returned to South Bend as Vice President of Studebaker's, he demanded the same convenience, beauty, and ultimate economy in his new home there. You can insure your clients the same advantages, whether your plans call for a simple cottage, an elaborate mansion, an apartment house, or a great hotel. The IN-VIS-O Screen Manual will bring you full details.

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16 pages of valuable technical data on screening modern windows. THIS COUPON WILL BRING YOUR COPY

IN-VIS-O Disappearing Roller Screen Company
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I shall be glad to receive for my files a copy of your manual on screening modern windows.

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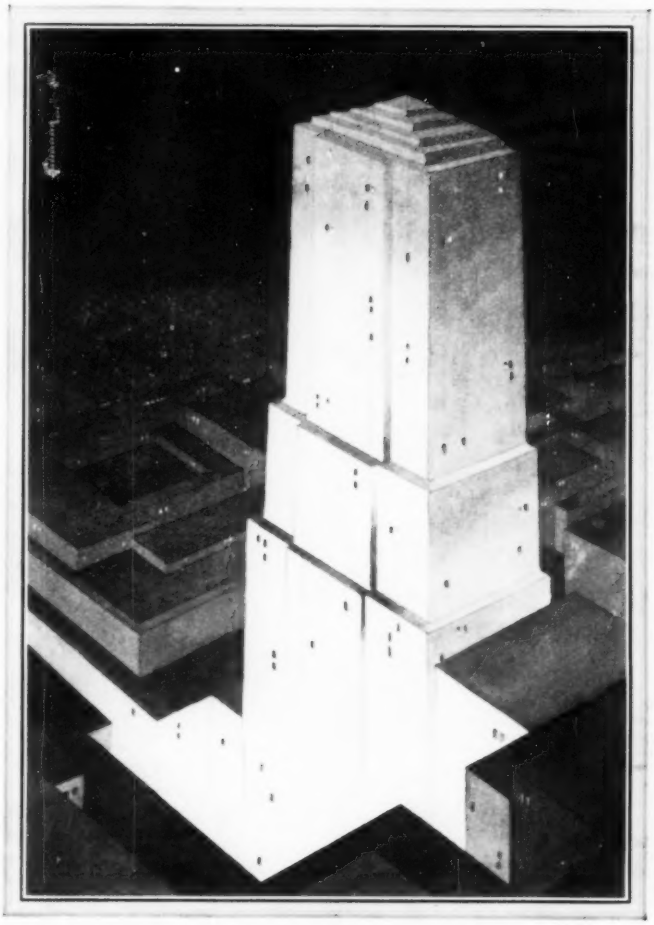

UNIFORMITY in the color of a modern finishing material is as definitely *structural* as the uniformity of composition. With the growth of new color tendencies in the decoration of interiors, the uniformity of colored finishes assumes new importance . . . . The rigid chemical control exercised by du Pont in every phase of manufacture begins with the raw materials. The high degree of uniformity of du Pont finishing products is, therefore, an inevitable result.

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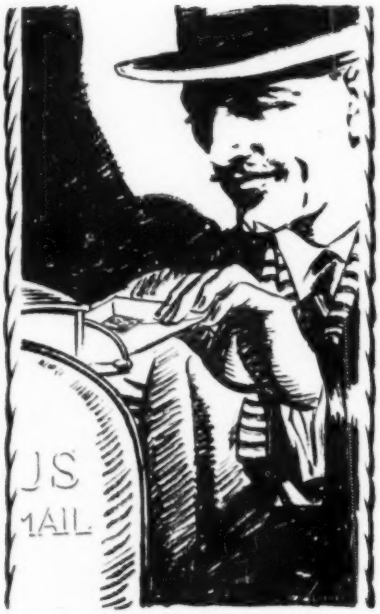

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The installation for apartment houses

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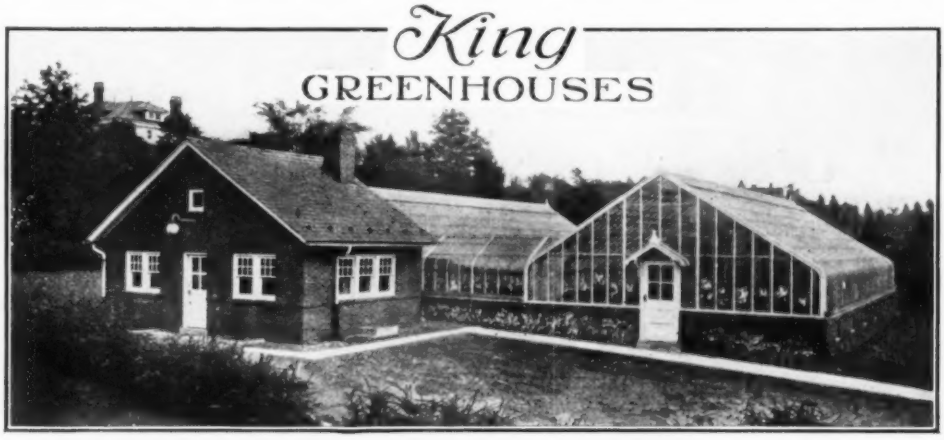
FLOORING

King GREENHOUSES



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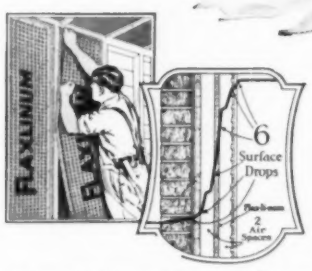

Insulate Homes .... with Flax-li-num

GOOD health is the most valuable thing in all the world — it means *everything* to children, as well as grown-ups. It cannot be bought at *any* price. Yet for no more than for a radio or a good piece of furniture, your client can have a FLAX-LI-NUM insulated home that *encourages* good health. For health's sake, build homes that are free from draughts — that are *comfortably warm* in winter — that are *comfortably cool* in summer.

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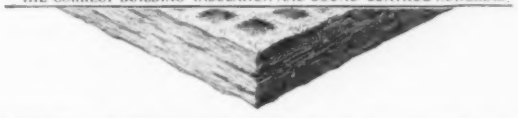

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Used correctly in walls, one-half inch FLAX-LI-NUM is *equivalent to three-fourths inch insulation* used as a substitute or installed against the sheathing. U. S. government tests prove this. The FLAX-LI-NUM method creates *two* insulating air spaces instead of one, and six surface resistances instead of four.

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For more than 17 years it has been used where correct insulation is imperative.

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2—Ease of Application
FLAX-LI-NUM goes in fast. The builder simply wedges the sheets in tight *—it goes in right.* The semi-rigid sheets hold themselves in place while the builder drives home a few nails.

3—Fool-proof on the Job
So simple is its installation that it is almost impossible to get it in wrong.

4 High in Tensile Strength
FLAX-LI-NUM, made from long, tough flax fibres, has great tensile strength. It does not puncture, crack, break or tear. It *never needs repairing after it is in place.*

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☐ I am interested in home construction.

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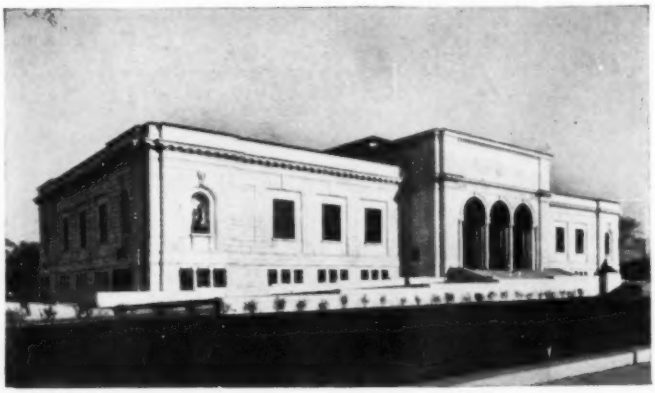

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May we send you our catalogue with further data on Vacuum Cleaning?

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The EDDY SINK

A New Model with Drain Board built integral.

A number of Builders have asked for a larger model "Eddy Sink," equipped with drain board. Here it is—and a beauty too.

Now Equipped with Drain Board - - -

For larger kitchens and where drain board is wanted use this Model L-168 with drain board on left, or R-269 with drain board on right.

Finished in white, gray or any color desired. Write for new Booklet.

THE D. A. EBINGER SANITARY MFG. CO.
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In Wellesley's Newest Lecture Hall

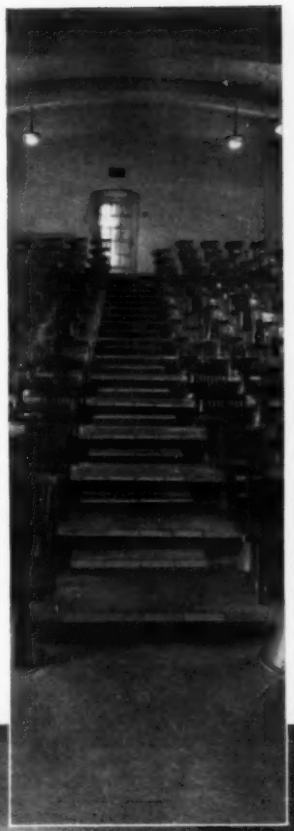
—*Non-Slip Steps of Alundum Tile*

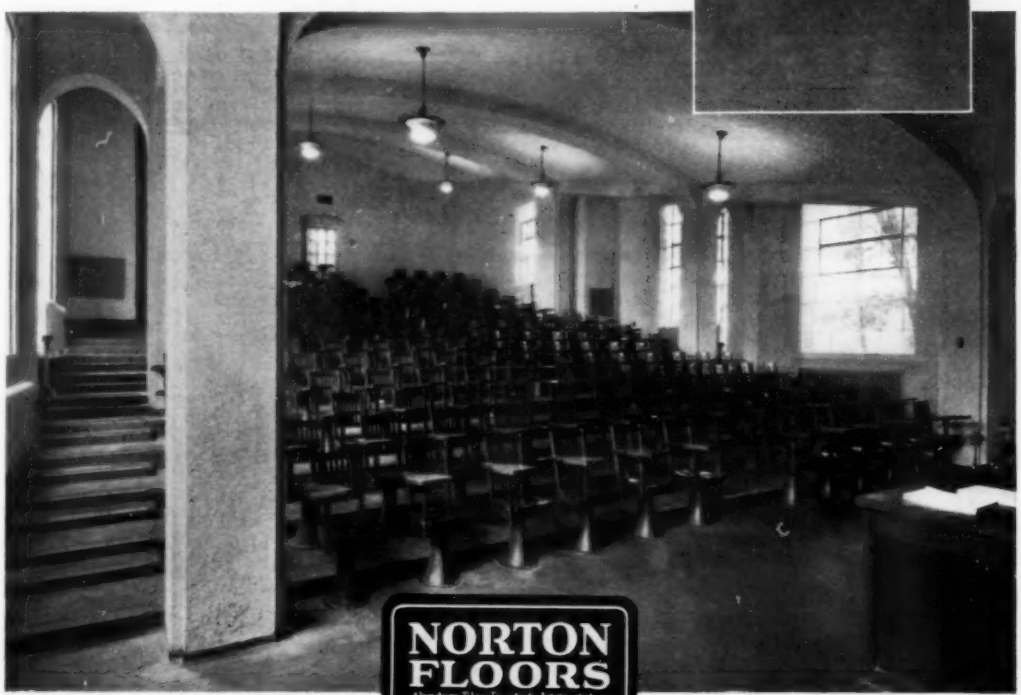
R-r-r-r-r-ing goes the closing bell. The girls swarm from their seats. They pour down the aisles. And the hustling feet are protected against slipping, for each step in the lecture hall of the new Botany Building has a nosing of Alundum Stair Tile.

Not only is this tile permanently non-slip but flat, without grooves or corrugations to catch heels. And because of the exceptional durability of Alundum Tile worn hollows will not appear under the heaviest and most concentrated traffic.

NORTON COMPANY, WORCESTER, MASS.

T-200





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Thomas Jefferson was Governor of Virginia, the Wandering Jew appeared in the streets of London, George IV was reigning across the water, and Wm., Geo., and Tracy Taylor established the firm of N. & G. Taylor Company in America.

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"Having tried your corkboard out on my own house, I am confidently recommending its use to my clients."

—Carina Eaglesfield Mortimer
Architect

"I am confidently recommending its use to my clients"

CARINA EAGLESFIELD MORTIMER, Architect, of New Haven, Conn., used Armstrong's Corkboard for the insulation of her own home in New Haven. And after experiencing the benefits of cork insulation during both winter and summer, Mrs. Mortimer wrote:

"As you possibly remember, our house has a jacket on the walls and roof of your corkboard. Last winter the house heated very quickly and held the heat remarkably long, keeping the coal bill well below estimate. The hottest days this summer the house was cool, many degrees lower than any city house I have been in before in the summer, notwithstanding the fact that we have no attic and use the room under the roof for master bedrooms. *Having tried your corkboard out on my own house, I am confidently recommending its use to my clients.*"

The advantage of cork-lining the house for both comfort and economy is unquestionable. From the structural standpoint also, Armstrong's Corkboard meets every requirement. The recommended thicknesses—1½-inch for walls and 2-inch for roofs—are easily erected *in a single layer*. Plaster is applied directly to the cork without lath. Furthermore, corkboard is non-absorbent, vermin-proof, and fire retarding.

Filing Catalog for Architects

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A Heatproof Lining for Walls and Roof

Church of the Cross, Methodist Episcopal, Cleveland Heights, O.
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including all sash and frames and all interior mill and cabinet work, was installed in this recently completed and thoroughly up-to-date educational building. We ask no higher testimonial to the quality of our work.

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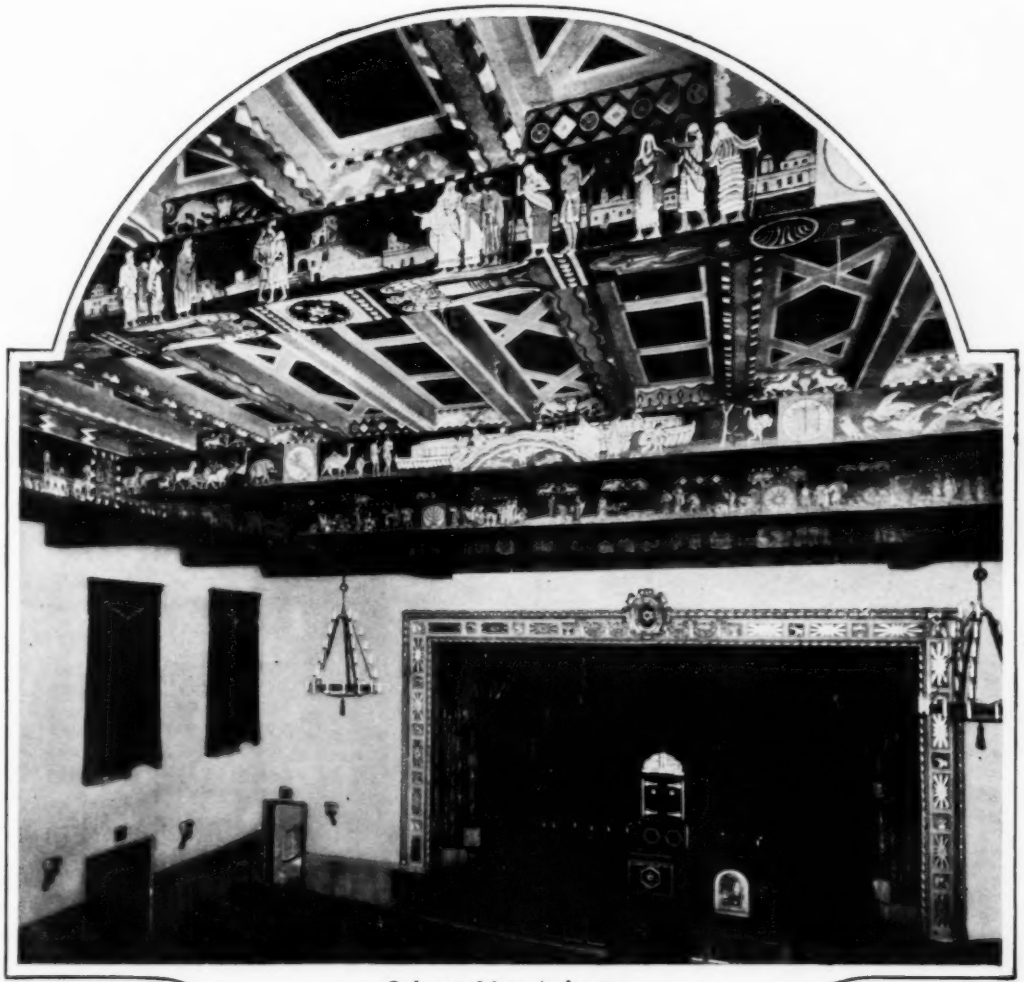

Ceiling in Main Auditorium
Temple House of the Union Temple, Brooklyn

Arnold W. Brunner, Associates, Architects; Vincent Maraghotti, Mural Decorator; Nathan C. Johnson, Consultant on Concrete Technology.

THE ceiling of the main auditorium, Temple House of the Union Temple, Brooklyn, is a distinguished example of the decorative possibilities of concrete. Here the mural decoration was applied to the surface of the concrete, which had first been treated with a specially prepared paint coat.

Portland cement concrete ceilings, as well as concrete fireproofing of steel beams present many unusual opportunities for this type of decoration. The concrete surface itself, *as left by the forms*, produces a variety of textures which are pleasing and interesting. Its economies permit decorative effects which might be otherwise unattainable within the cost estimates.

PORTLAND CEMENT *Association*
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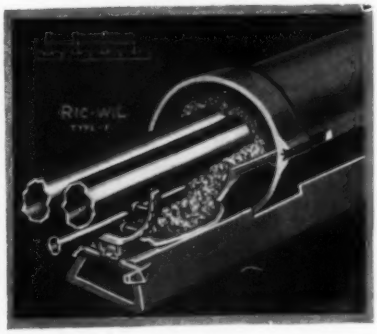
ONLY Ric-wiL GIVES YOU THESE 7 UNDERGROUND CONDUIT ADVANTAGES



1—A Base Drain that guarantees safe, adequate, immediate drainage, that costs less installed than round drain.

2—A conduit with Loc-liP Side Joints which absolutely seal the split sides and lock top and bottom halves together. Easily inspected. Water-tight.

3—Pipe supports that carry pipes independent of the conduit and that are quick and easy to install.

4—Four types of insulation, including Ric-wiL Dry-paC, to meet every condition.

5—Cast Iron Ric-wiL for extra heavy duty to eliminate special reinforced concrete construction.

6—A compact, interlocking construction throughout that assures permanent dry efficiency.

7—Such savings of labor, trenching and extra materials that Ric-wiL costs no more, and often less, than ordinary or field built conduits.

These advantages, the results of progressive modern engineering, only Ric-wiL gives you. Be sure to get full information and estimates on your next job.

The Ric-wiL Company

Originators of Waterproof Conduit Filler

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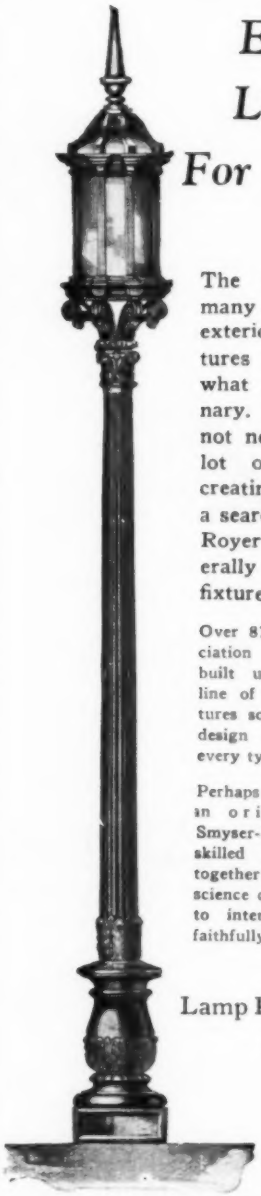
RIC-WIL UNDERGROUND CONDUIT



Exterior Lighting For Any Job

The architect's plans many times call for exterior lighting fixtures that are somewhat out of the ordinary. Such a case does not necessarily mean a lot of time lost in creating new designs—a search of the Smyser-Royer Catalog generally reveals the exact fixture wanted.

Over 87 years of close association with architects has built up the Smyser-Royer line of exterior lighting fixtures so that now there is a design available for almost every type of job.

Perhaps the architect desires an original design—the Smyser-Royer organization skilled in artistry in iron together with modern lighting science can be depended upon to interpret his conception faithfully and accurately.

Lamp Posts Lanterns Brackets

No. 399
Scale, ½" = 1'0"
12'6" high over all
Base, 12" square

SMYSER-ROYER CO.

Main Office and Works YORK, PA.

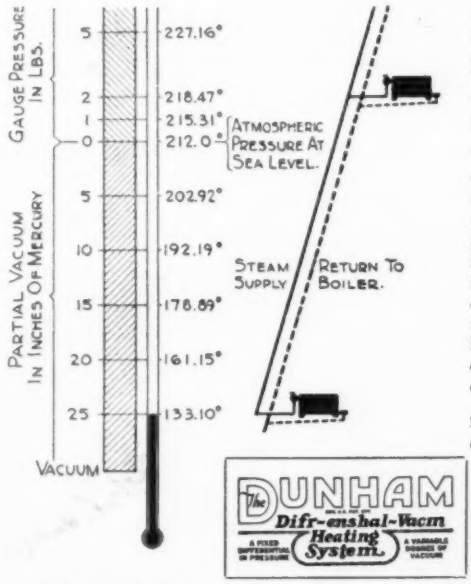
A·L·E·A

Philadelphia Office 1700 Walnut St.

What is sub-atmospheric steam?

SUB-ATMOSPHERIC steam is steam generated at pressures below atmosphere and which in a Dunham System flows to all radiators quickly and quietly at a rate and temperature which assures comfort, irrespective of changing weather out of doors.

Sub-atmospheric steam is supplied at temperatures as low as the water temperature in a hot water heating system, or at the temperature of vapor heating (depending on requirements of mild or severe weather). The diagram reproduced here illustrates the reduction in the temperature as the pressure is reduced.



At atmospheric pressure water boils at 212°, whereas the Dunham Differential Vacuum Heating System circulates steam as low as 133°. This corresponds to 25 inches of vacuum by the gauge. The sub-atmospheric pressure being carried on the system will be shown on the vacuum side of gauge on the boiler.

This system is without a peer in its flexibility of control and in the ability of the radiators to operate efficiently under these wide variations in sub-atmospheric steam pressures and steam temperatures. Fuel waste, caused by overheating in mild weather which constitutes 95% of the heating season, is eliminated by regulating the heat emission of the radiators in the Dunham Differential Vacuum Heating System so as to balance the heat loss of the building and thus maintain a desired building temperature regardless of outdoor temperature.

Steam is circulated in the radiators and piping during the greater part of the heating season under a high vacuum. During zero or severe weather the sub-atmospheric pressure is carried at different values, being modified to increase the temperature of the steam in direct relation to the heat demand, in accordance with outside temperature and wind effect.

The DUNHAM Difr-en-shal-Vacm Heating System.
A FIXED DIFFERENTIAL OF PRESSURE — A VARIABLE DEGREE OF VACUUM

Look for the Name
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This nameplate identifies a genuine DUNHAM Radiator Trap

Over seventy branch and local sales offices in the United States, Canada, and the United Kingdom bring Dunham Heating Service as close to you as your telephone. Consult your telephone directory for the address of our office in your city. An engineer will counsel with you on any project.

U. S. Patent No. 1644114. Additional patents in the United States, Canada and Foreign Countries now pending.

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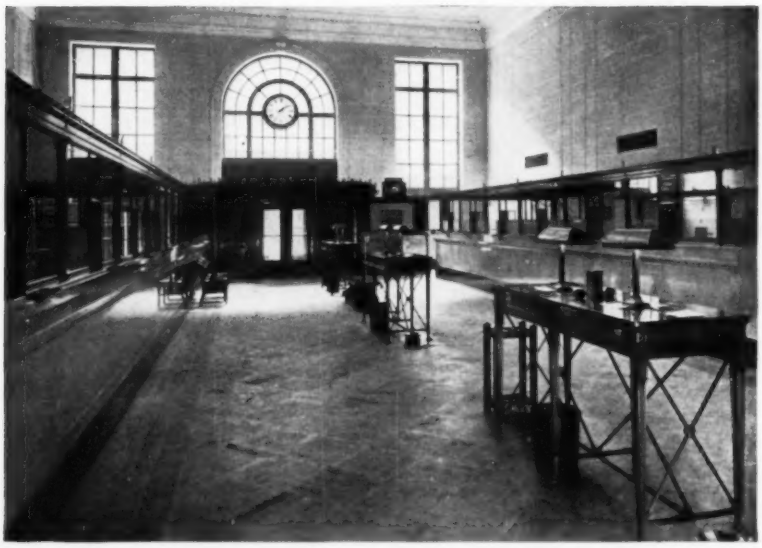

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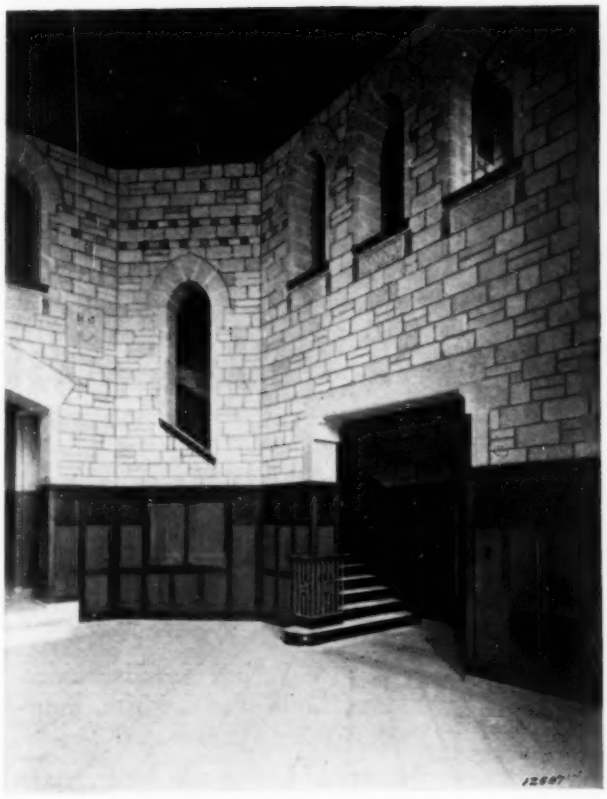

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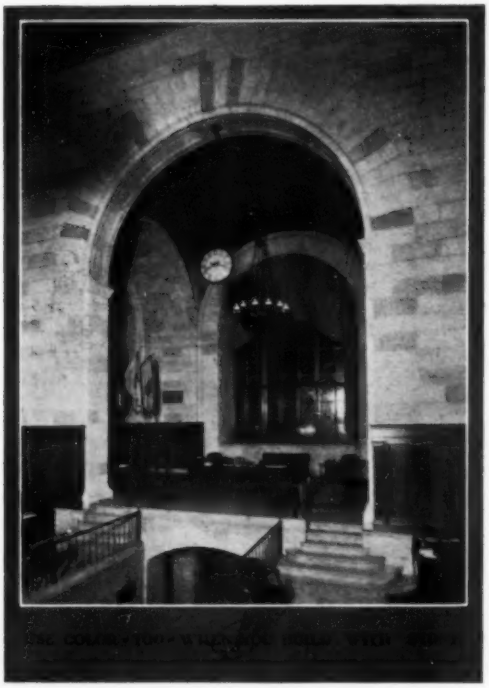

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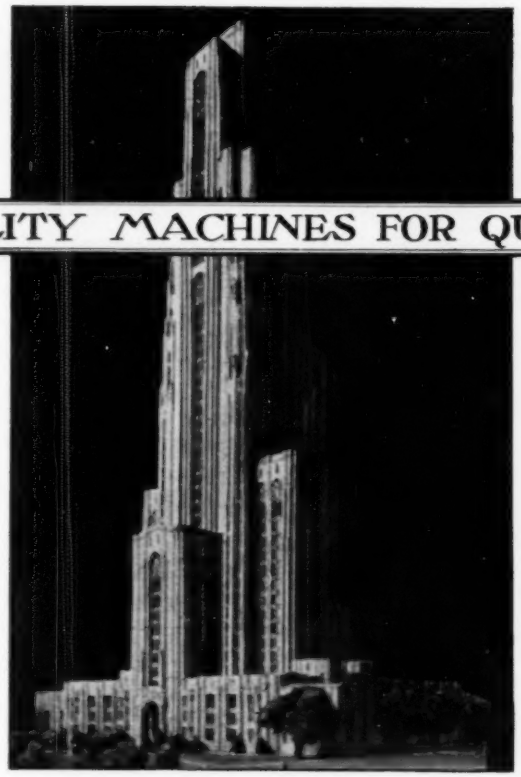

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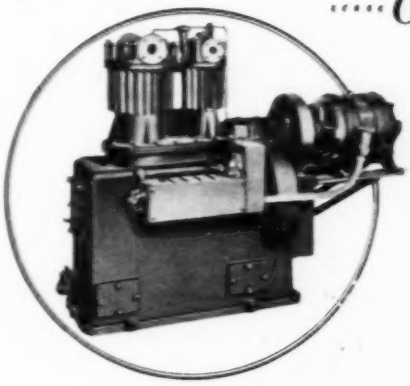

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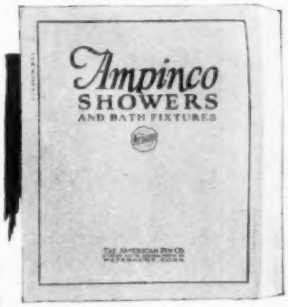
Ampinco SHOWERS



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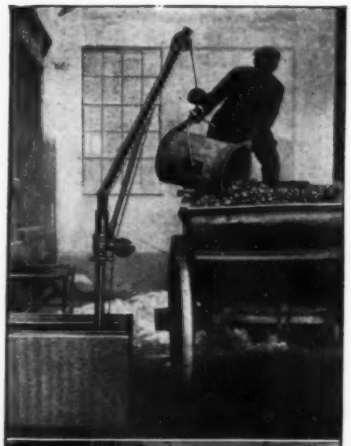

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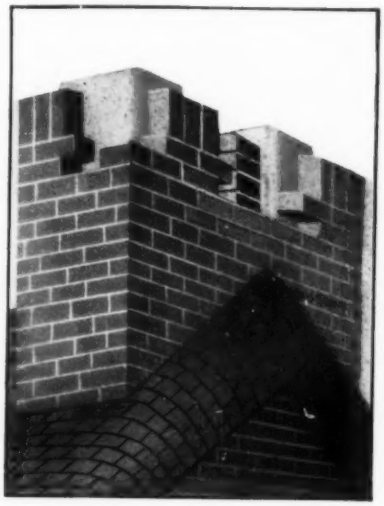

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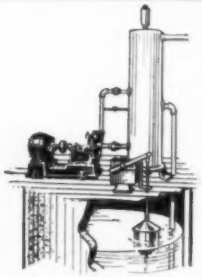

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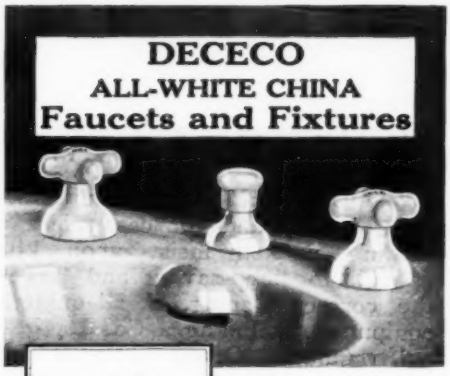

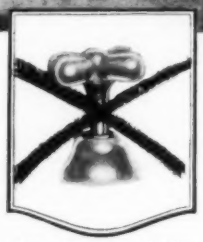

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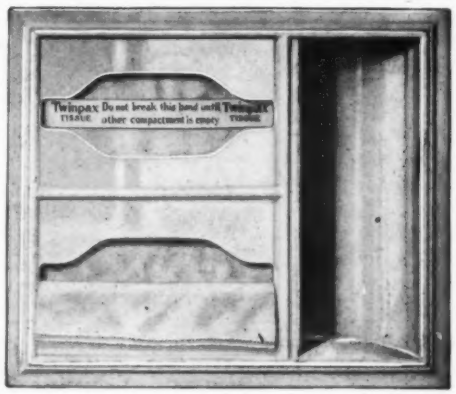

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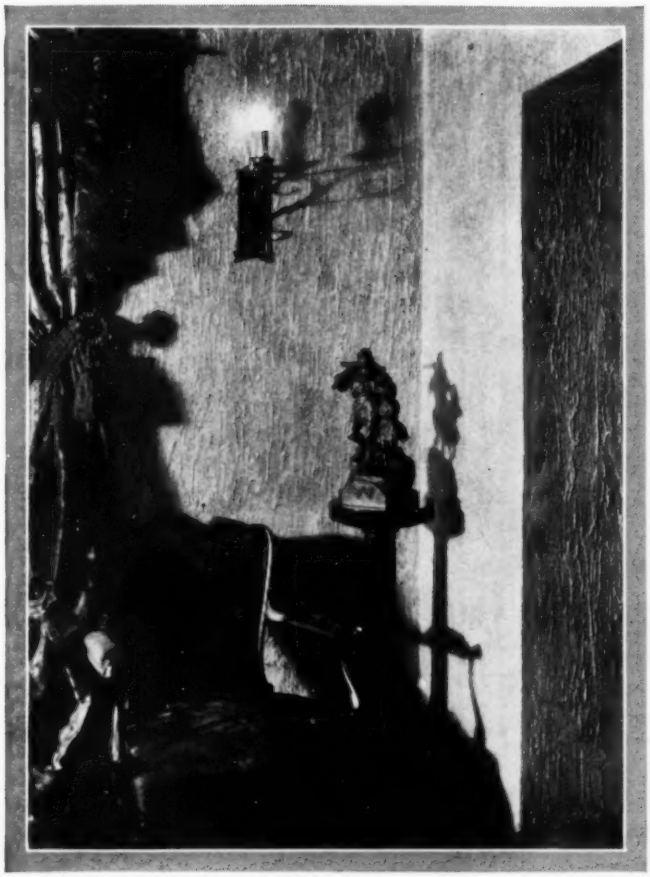

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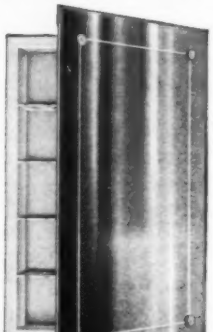

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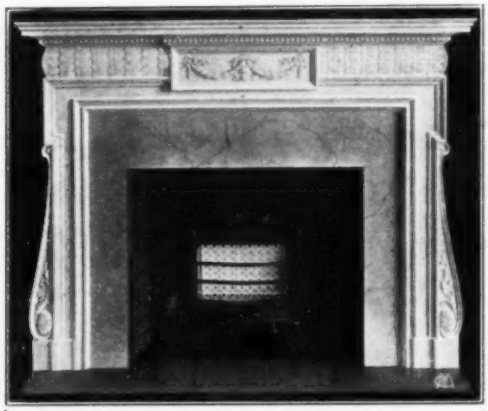

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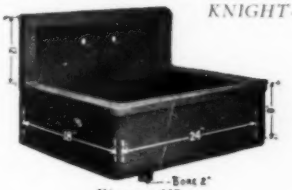

Figure 237.

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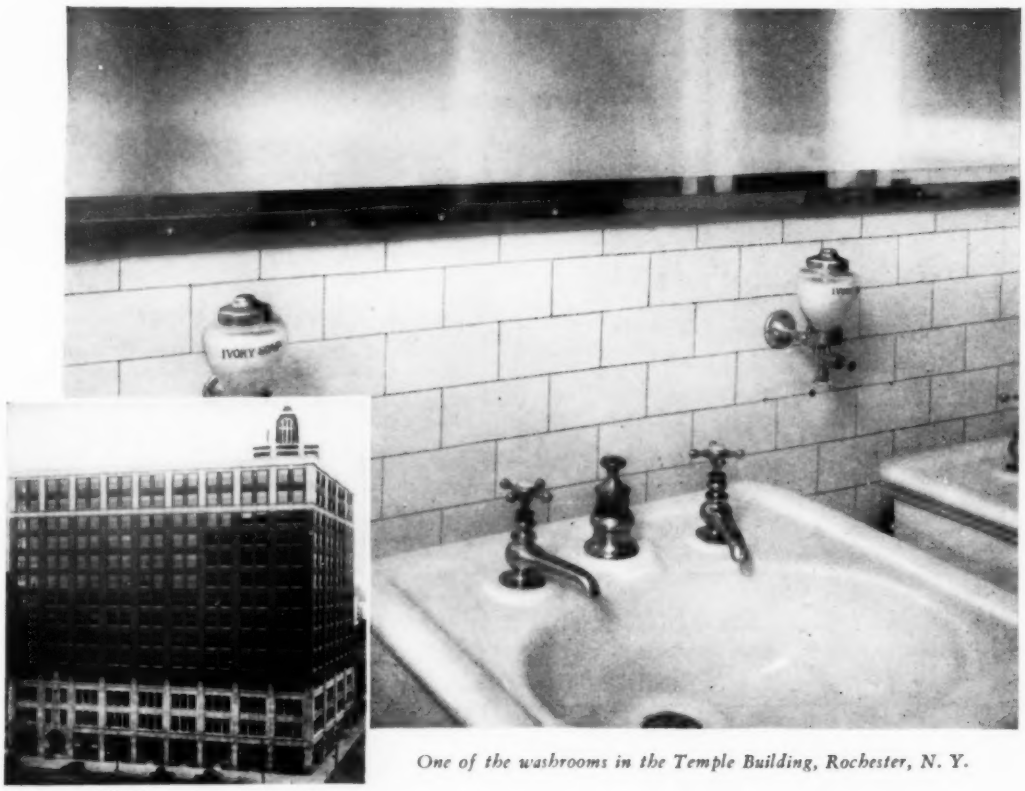

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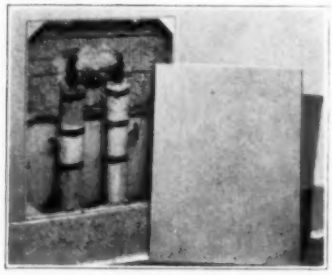

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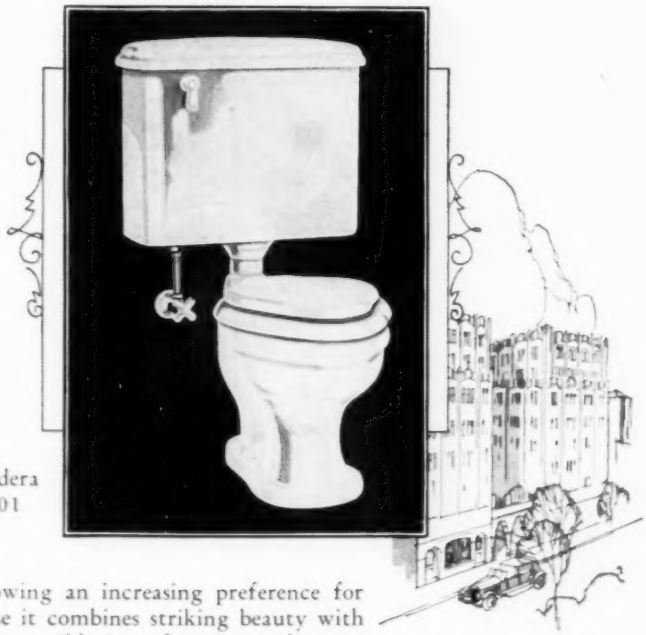

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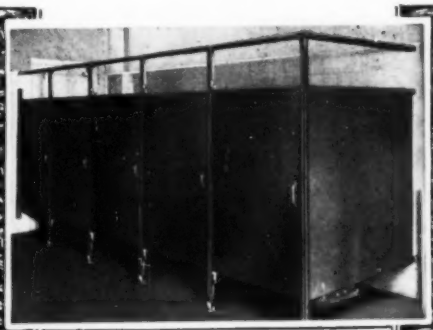

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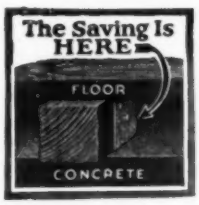

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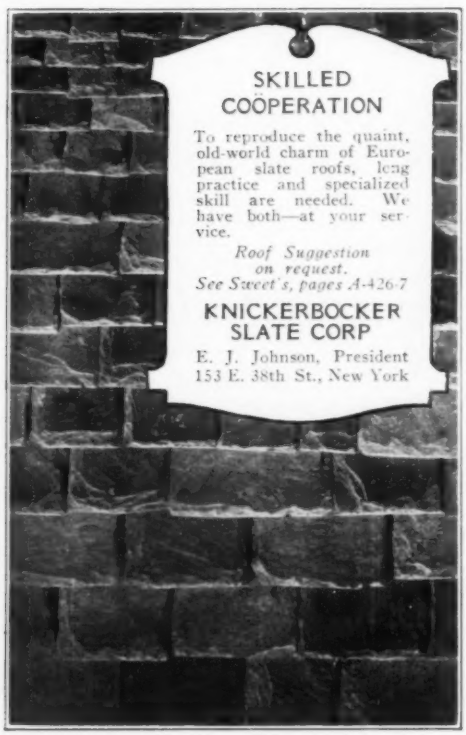

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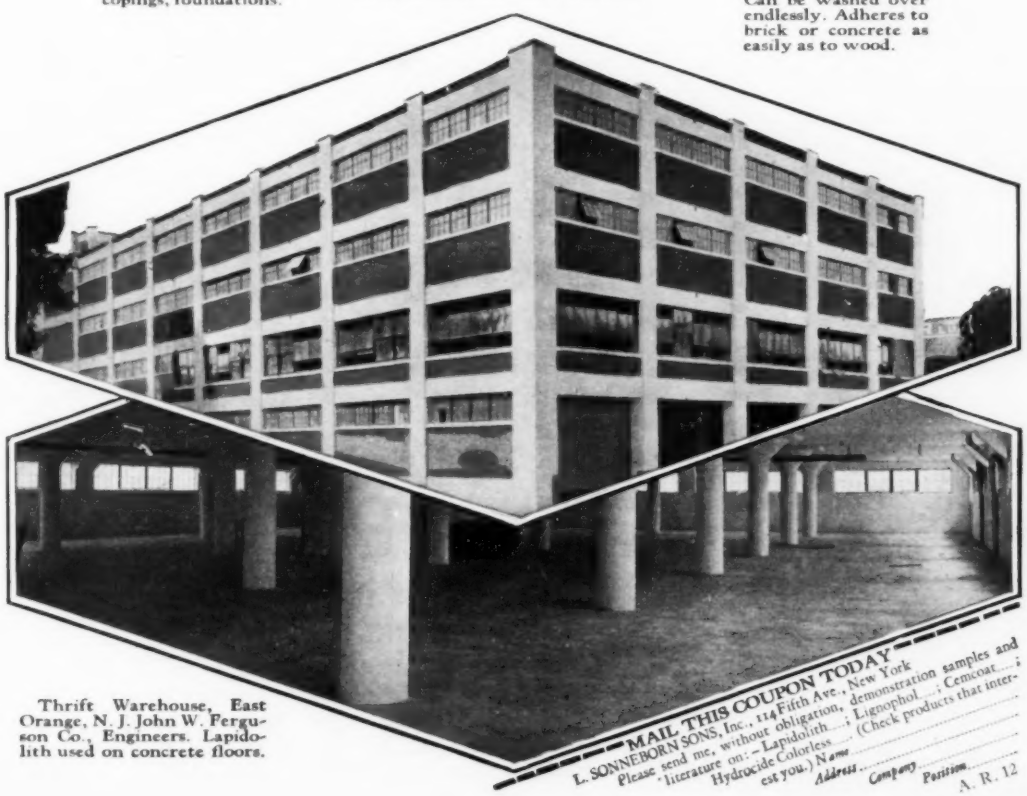

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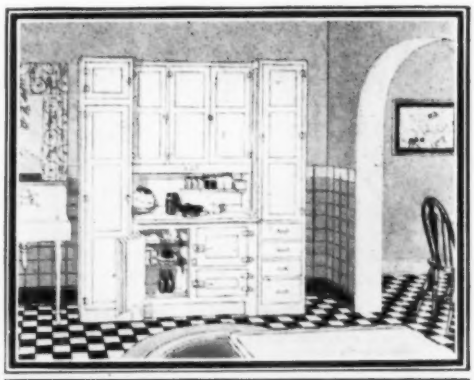

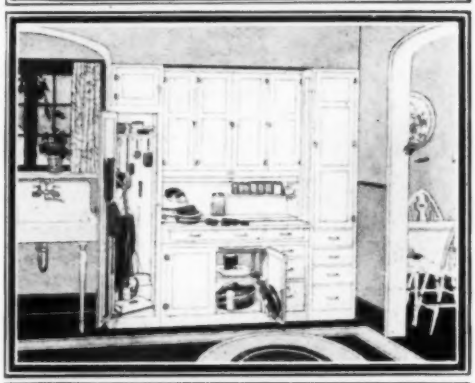

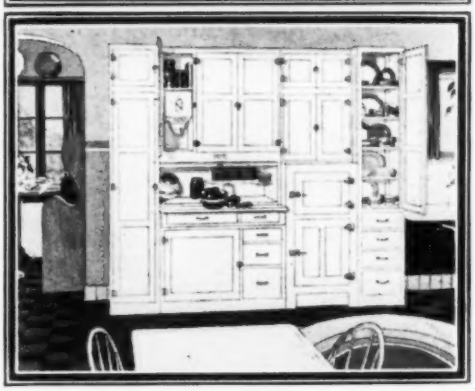

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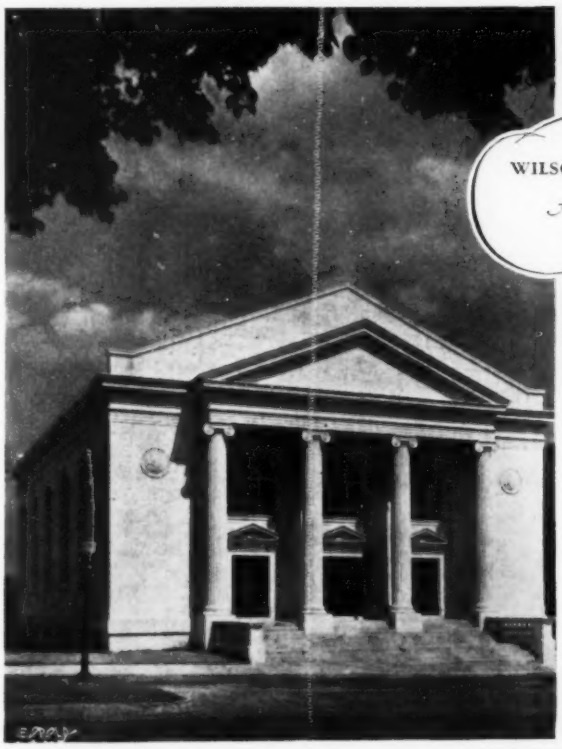

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